DOCUMENT RESUME

ED 024 181 24 EC 002 747

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A Comparison of Group Versus Individual Production of Non-Verbal Artistic Creativity. Final Report.

Eastern Michigan Univ., Ypsilanti. Coll. of Education.

Spons Agency- Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No- BR-5-8295

Pub Date Jan 68

Contract- OEC-6-10-290

Note- 152p.

EDRS Price MF-$0.75 HC-$7.60

Descriptors- Creative Art, Creative Expression, *Creativity, Creativity Research, Elementary School Students, *Exceptional Child Research, Imagination, Intelligence, Nonverbal Ability, Originality, Secondary School Students, Socioeconomic Influences, Testing, Test Results, *Tests, Test Validity

Identifiers- Nonverbal Artistic Creativity Instrument

Two tests, one with six cursive shapes and the other with six colored angular shapes to be arranged artistically, were examined to determine whether the degree of non-verbal artistic aspects of creativity is greater in products of individuals or in products of groups. Each test was give both individually and in small groups to 499 students (grades 1 to 12). Three judges independently evaluated the arrangements on a 9-point scale for aesthetic organization, redefinition, originality of elaboration, and fluency of ideas. Mean correlations of the four criteria for each of the judges ranged from .82 to .86 for the first test and .76 to .83 for the second. The composite scores of all subjects, in comparing individual with group productivity, had t-ratios significantly in favor of the group ($p<.02$). Differences between individuals and groups were significant for grades 1 and 2 for the first test ($p=.01$); were not significant for grades 3 to 7 for both tests; and were significant for the first test in grades 8 to 12 in favor of group creativity ($p<.001$). Females were more creative than males for all grades combined ($p<.05$) with cultural differences suggested. No significant differences were found between art and non-art students, between high and low general verbal ability groups, or between occupational groupings (by head of household). The tests are appended. (SN)

BR-5-8295
PA-24

ED0 24181

FINAL REPORT

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January 1968

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

Office of Education
Bureau of Research

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Stephen Charles Zambito

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The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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ACKNOWLEDGEMENTS

I wish to express my great appreciation to the many individuals who have graciously given their time and assistance during the progress of this research study. Without their cooperation and contributions the completion of this investigation would not have been possible.

To my research assistant, Mr. Douglas W. MacPherson, I give a very personal "thank you" for the many hours he voluntarily gave to accomplish the many tasks necessary to complete this study. I owe a very special debt of gratitude to Dr. Stanley E. Dimond and Dr. Frank B. Womer for their scholarly advice during the development and culmination of this research report. A similar appreciation is due to Professor Kishor Wahi for his valuable assistance on research design and statistical procedures.

I also wish to acknowledge the contributions made by the following individuals: Mr. Richard Neal for the many hours of voluntary assistance he gave during the experimental stage of this investigation; Dr. Bert I. Greene for his advice and support during the planning of this study; Dr. Herbert Tothill for the careful reading of the manuscript and the final masters; Professor Darlene Mood for her very helpful interpretations of the data; the judges, Professors Thomas E. Dodd, Wendel W. Heers, and David L. McKay, for their expert evaluation of the creative products; Dr. Lester W. Anderson, Dr. Finlay C. Penix, Dr. Kenneth E. Vance, for reading the final manuscript and offering valuable suggestions; and Mr. Robert Crout for performing so willingly the many tasks requested of him.

Deserving of another special thanks are Mrs. Maryalice Beauton and Miss Linda Lockwood for typing the manuscript and for coming to my rescue at the last minute to retype some of the spoiled masters. To Mr. Richard W. Beauton, I also extend my gratitude for his conscientious help in printing and collating the pages of the final report. Thanks are also due to my secretaries and typists during the various stages of this report: Mrs. Marie Dean, Mrs. Margie Janet Easto, Mrs. Colleen M. Ecclestrom, Mrs. Karen Lee Shamanski, and Miss Bonnie Willings.

I am indebted to the four hundred and ninety-nine students of Roosevelt School who participated in the testing of this investigation and to the many teachers who graciously and patiently devoted their time. To Mr. Alister MacDonald, acting principal of Roosevelt School, I wish to give a special recognition for his kindness in facilitating the testing procedure.

Much thanks are also due to Mr. Ralph A. Gessler, Associate Director, and Mrs. Louella E. Boyd, Executive Bookkeeper of the Division of Field Services for handling the financial end of this project; to the Department of Education for alloting the time necessary to carry out this research; to Dr. Ralph E. Smith for providing the space and equipment needed while the data was being analyzed; and to the administration of the University for encouraging and supporting research.

Appreciation is also expressed to the U. S. Office of Education for its sponsorship of this research, under Project No. 5-8295.

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CHAPTER I

INTRODUCTION TO THE RESEARCH

From the early stages of civilization to the present day, man has made great strides in the various fields of art and science and in the inventiveness and application of technology. The creative force that produced the first tool which helped man adapt to his environment, the first painting on the wall of a cave that expressed man's perception of his surroundings, and the same creative force that discovered the law of relativity is yet not clearly known. How creativity is manifested, how it develops, and what makes it generate are questions that still must be answered.

Significance of the Study

The significance of studies on creativity is documented by the fact that much of the recent literature abounds with an emphasis on creativity as an important part of the educational process. The accumulative aspect of this interest has occurred since 1950.

Researchers have separated the creative endeavors of man into two parts--verbal and non-verbal. The numerous studies on creativity have dealt principally with many factors of the verbal domain but little has been done to assess factors which relate to non-verbal artistic creativity. The limited number of published studies in the non-verbal artistic creative domain have centered around responses of individuals. To this researcher's knowledge none of these studies has treated a comparison of individual creativity to group creativity. The present study is an attempt to discover if non-verbal artistic factors of creativity are greater in the product of the individual or in the product of the group.

The implications of such a study for classroom practices are potentially significant. It may furnish the teacher with information that would be valuable in fostering non-verbal artistic creativity of students at various age levels when working individually or in groups.

Important to any study is the impetus it may provide for further research. This study may help to open up avenues of exploration into the dynamics of individual and group productivity in the non-verbal artistic area. Hence, the area of investigation may have import to the educational process.

Definition of Creativity

Attempts to define creativity have produced a wide range of variations. From the many statements concerning creativity, the one by Hilgard gives specific meaning to the creative process in terms of productive outcome. He defines it as:

> . . . the kind of thinking that discovers new relationships, achieves new solutions to problems, invents methods or devices, produces new artistic objects or forms.[1]

Guilford approaches the problem of defining creativity as a product of a personality behavior:

> Creative personality is then a matter of those patterns or traits that are characteristic of creative persons. A creative pattern is manifest in creative behavior patterns, which includes such activities as inventing, designing, contriving, composing, and

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[1] Ernest R. Hilgard, Introduction to Psychology (2nd ed.; New York: Harcourt, Brace and Company, 1957), p. 305.

> planning. People who exhibit these types of behavior to a marked degree are recognized as being creative.[1]

Torrance implies that the process of creativity is more in line with problem solving. He states that:

> . . . learning and thinking creatively takes place in the process of sensing difficulties, problems, missing elements, gaps in knowledge, making guesses to formulate hypotheses about these deficiencies; testing these hypotheses and possibly revising and restating them; and in communicating the results.[2]

Although there are many more definitions or statements which can be extracted from the literature, the above three statements seem to illustrate the three categories of creativity--production, personality, and process. However, these three definitions have obvious similarities of contextual meaning.

The core of the underlying concepts suggested by the similarity of meaning is synthesized by Scofield in the statement:

> Creativity . . . defined is the idiosyncratic perception of new intellectual relationships never before experienced by the individual between two or more stimuli.[3]

Scofield suggests that when an individual gains insight into the relationship of ideas which the individual never knew or experienced before, and performs the process by himself, he is then considered to have performed a creative act. This is true even though the product of his creation has been performed or is known by others.

---

[1] J. P. Guilford, "Creativity," American Psychologist, V (1950), 444.

[2] E. Paul Torrance, "Are the Gifted Being Challenged to Think and Learn Creatively?" (Minnesota: Bureau of Educational Research, University of Minnesota), Paper prepared for presentation to the Sacramento State College Association for Gifted Children, Sacramento, California, October 14, 1961, pp. 4-5.

[3] Robert W. Scofield, "The Creator is Himself Created," Educational Leadership, XVIII (1960), 5.

The definition by Scofield will be used in this study because his definition has general applicability and because it appears to be a synthesis of the underlying concepts manifested by the similarity of meaning within other definitions.

Background of the Study

There are two broad areas of concern which have been influential in developing the present study.

1. Since students manifest and utilize non-verbal creativity in varying degrees, the concern is: how can these abilities be identified and how can they best be channeled with appropriate teaching methods?

2. Since classroom teachers utilize non-verbal artistic creative tasks in their classroom activities, both in individual and group projects, the concern is: what kind of involvements are conducive to maximizing creative expression and at what stages of the students' developments are these activities most productive?

Prior to the formulation of this investigation a similar study was done on a trial basis. The intention was to help clarify and perfect some of the testing methods and the research design, for comparing non-verbal aspects of artistic creativity in the product of the individual and in the product of the group. A sampling was selected from the Wayne Public School System located within the Metropolitan Detroit area.

The sample of the pilot study consisted of 161 students, 54 from two third-grade classes, 52 from two fifth-grade classes, and 55 from two eighth-grade classes. The instruments, the testing procedure, the criteria for evaluation, and the criteria for the selection of the judges were similar to the present study.

The results of the pilot study indicated that at the third-grade level the artistic non-verbal creative products of groups were significantly better than the products of the individuals. Similarly, the group products of the fifth graders obtained higher rankings than the products of the individuals. The differences were statistically significant both at the third- and fifth-grade levels. However, the data on eighth graders showed differences between group products and individual products that were not statistically significant.

Further analysis showed some differences among the three grades. When the z-scores and rankings were compared, the inference derived was that products of third-grade groups when compared with individuals in third grade were more creative than products of fifth-grade groups when compared with individuals in fifth grade. In similar fashion, when comparing products of groups to products of individuals, there was evidence that fifth-grade group products were seen to be more creative than products of eighth-grade groups. A conjecture was made from the implications of the data that the degree of artistic non-verbal creativity in products of groups when compared to products of individuals decreases with the advancement of grade levels.

The patterns revealed by the results of the pilot study reinforced the direction the present study was to take. In addition, the pilot study helped to clarify and refine some of the procedures to be used in the investigation.

Purpose of the Study

The purpose of this study is to determine whether or not the degree of non-verbal artistic aspects of creativity are greater in products of individuals or in products of groups. The non-verbal artistic factors of creativity in this study are the expressions produced by an artistic arrangement of abstract forms.

More specifically, this study will attempt to test ten hypotheses. However, since this study is exploratory in nature, the hypotheses are stated in the form of null hypotheses.

1. There are no significant differences in ratings of non-verbal artistic creative products among grades one through twelve.
2. There are no significant differences in ratings of non-verbal artistic creativity between individual and group products for all grades combined.
3. There are no significant differences in ratings of non-verbal artistic creativity between individual and group products for groups of grades.
4. There are no significant differences in ratings of non-verbal artistic creativity between products of male and female subjects for all grades combined.
5. There are no significant differences in ratings of non-verbal artistic creativity between products of male and female subjects for groups of grades.
6. There are no significant differences in ratings of non-verbal artistic creativity between products of non-art and art students for grades nine through twelve combined.

7. There are no significant differences in ratings of non-verbal artistic creativity between products of above average and below average verbal mental ability groups for groups of grades.

8. There are no significant differences in ratings of non-verbal artistic creativity between products of above average and below average non-verbal mental ability groups for groups of grades.

9. There are no significant differences in ratings of non-verbal artistic creativity between products of above average and below average general mental ability groups for groups of grades.

10. There are no significant differences in ratings of non-verbal artistic creativity products of individuals among occupational groupings for all grades combined.

Procedure

The subjects included in this investigation were all the students from grades one through twelve enrolled at Roosevelt School, Eastern Michigan University. The school, under the jurisdiction of the University, serves as a research center and a laboratory setting for student teaching.

The instrument used to assess individual and group non-verbal artistic creativity of students was devised by the investigator. It has two forms. Form one, labeled Test X, consisted of a 12" x 18" gray sheet of construction paper and six cursive shapes of various colors. The second form, Test Y, was made up of a tan 12" x 18" sheet and six different colored angular shapes. (See Appendix A).

Students within each grade level were divided randomly into two groups. While one group was given Test X as individuals, the other group was given the same test in randomly selected small groups. This procedure was reversed when the second test form was applied.

The individual and group products produced by the subjects were then evaluated by three judges chosen for their competency in the area of non-verbal artistic creativity. Acting independently, the judges scored the products using a nine-point scale on each of the following criteria: Aesthetic Organization, Redefinition, Originality of Elaboration, and Fluency of Ideas.

The data collected were analyzed statistically on the following variables: differences between individual and group, differences among grade levels, differences between sexes, differences in mental abilities, differences between non-art and art students, and differences among occupational groupings based on the occupation of the head of the household.

Operational Definitions

For the purpose of this study the following terms and definitions are employed throughout:

Product - is a visual representation of the creative artistic expression of the individual or group. The substance of the product was formed by the student or students using six colored abstract shapes and a sheet of background paper 12" by 18" of neutral color. These forms were pasted together by the students in accordance with their creative expressive needs.

Creativity - is the behavioral characteristic of the individual as defined by Scofield (page 3). Operationally for this study, creativity manifested by the products is interpreted to be the totality of four defined criteria: Aesthetic Organization, Redefinition, Originality of Elaboration, and Fluency of Ideas.

Non-verbal factors - are artistic symbols or forms, other than words, utilized by the individual as a means of expressing himself creatively. These symbols or forms may be categorized as representational factors or abstract factors.

Limitations of the Study

The findings of this investigation are relevant only to the student population of the Roosevelt School, a laboratory school on the campus of Eastern Michigan University.

Another limitation is the manner in which the criteria used in judging the creativity of the products are interpreted. Even though the four criteria were listed and clearly defined, and were discussed among the judges, flexibility of interpretation by the three judges is inevitable.

A further limitation is the degree of subjectivity used by each of the judges. Although the judges were selected for their competency, the element of personal subjective preference of likes and dislikes in judging the creative products cannot be eliminated.

Organization of the Study

The study is organized in the following manner: Chapter I introduces the significance of the study, the definition of creativity, some background information related to the development of the study, the purpose and hypotheses to be tested, a summary of the procedure, some pertinent operational definitions, limitations, and the plan of presentation.

Chapter II reviews the significant literature related to this study.

Chapter III, concerned with design and methodology, discusses the research site and population; the development and description of the creativity instruments; the testing procedures; the criteria for evaluation; the evaluation procedure of the creative non-verbal artistic products; the criteria for and selection of the judges; the training of the judges; the independent variables, such as: mental abilities, grade levels, male and female subjects, occupational groupings; and the statistical measures used to analyze the data.

Chapter IV presents the analysis of the data. Part One reports the inter-rater reliability of scores given by the three judges and the correlation coefficients between each of the criteria and the composite score. Part Two reports comparisons among grade levels and comparisons of individual and group. Part Three compares individual creativity to sex, art instruction, differences in mental abilities, and differences among occupational groupings.

Chapter V discusses and interprets the data. In addition, it presents the summary and conclusions of the study.

CHAPTER II

SELECTED REVIEW OF THE LITERATURE

There is little doubt that a considerable momentum has been generated in the exploration of creativity since 1950. This growth of interest has most often been attributed in the literature to Guilford[1] as a result of his Presidential Address to the American Psychological Association in 1950. He brought to light the gross neglect of this area on the part of psychologists by pointing out that from about 121,000 titles published during the twenty-three years prior to 1950 less than 0.2 per cent could be identified as related to creativity.

A dramatic increase in this exploration has been made evident by Parnes and Brunelle.[2] They have roughly estimated that 1,250 bibliographic entries on creativity appeared during the period from January, 1965 to June, 1966. This number almost equalled that of the previous five years, which in turn matched the entries of the preceding ten years. A similar interest has been reflected in the production of doctoral dissertations in the area of creativity. During the same one and half year period almost two hundred dissertations were reported, whereas only about three hundred such studies existed prior to 1965.

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[1] J. P. Guildford, "Creativity," American Psychologist, V (1950), 444-54.

[2] Sidney J. Parnes and Eugene A. Brunelle "The Literature of Creativity: Part I; Evaluative Research on the Nature of Creative Behavior," The Journal of Creative Behavior, I (1967), 52.

Very evident within the literature is the considerable diversity among theorists, researchers, and practitioners concerning the meaning of creativity. Yamamoto[1] suggests that this confusion in the study of creative behavior is a consequence of the differences in: (1) the points of view in defining creativity, (2) the assumptions and presuppositions concerning the theories and processes of creativity, and (3) research approaches among investigators with different theoretical frameworks.

The attempt to define creativity has been a challenging problem to many people within various areas of interest. No definition that has come out of the literature has been inclusive enough to cover all the concepts that have been attached to it. In an endeavor to find common relationships within the various interpretations of creativity, Rhodes[2] extracted from the literature some fifty definitions which he was able to classify roughly into four broad categories. He called these four areas person, process, press, and product of creativity.

The definitions which fell into the category of "person" dealt with references to the physical and psychological characteristics of creative individuals. The area termed "process" covered those definitions which were concerned with maturation, perception, and mental operations as means of creating new ideas. References to the relationships between human beings and their environment were attributed to definitions falling within the "press" classification. Those definitions, however, which treated the results of creative ideas, either as consequences in themselves or as manifestations of visual representations were associated with the "product" category.

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[1] Kaoru Yamamoto, "'Creativity' - A Blind Man's Report on the Elephant," _Journal of Counseling Psychology_, XII (1965), 432.

[2] Mel Rhodes, "An Analysis of Creativity," _Phi Delta Kappan_, XLII (1961), 306-307.

Theories of Creativity and the Creative Process

Although research studies have focussed mainly on person and product, much also has been written speculatively on the theoretical position and process of creativity. As far back as 1926, Wallas[1] conceived of the act of creative thinking as passing through four stages. The first stage is preparation, in which the creator gathers his ideas and explores different methods of testing them. The next stage is the interval of incubation, a period of unconscious formation of nascent solutions. Then blossoms the moment of illumination when the creator evolves tentative solutions, and the concentration of ideas comes into focus. Finally, the creative process enters the phase of verification where the creator differentiates what is valid from what is not by consciously elaborating, altering, and correcting.

Kneller,[2] however, although agreeing to the four phases, added an initial step identified as first insight. Here the creator senses the igniting spark which is the impulse to create on the anticipation of an idea to be realized.

Marksberry,[3] on the other hand, slightly altered the interpretation of the four stages. The preparation begins when an individual senses a strong need to initiate an activity which is triggered from the interrelationship of all his past experiences. The incubation stage is a period of restlessness when the individual weighs the problems and searches for solutions. She defines the next stage as insight, illumination, or inspiration. Through a sudden hunch the creator sees the solution and enters the next stage when he checks, tests, criticizes, and polishes his solution.

---

[1] Graham Wallas, The Art of Thinking (New York: Harcourt, Brace and Co., 1926).

[2] George F. Kneller, The Art and Science of Creativity (New York: Holt Rinehart and Winston, Inc., 1965), pp. 47-57.

[3] Mary Lee Marksberry, Foundation of Creativity (New York: Harper and Row, 1963), pp. 17-20.

Rugg's[1] identification of the four stages as preparatory consciousness, interlude, insight, and verification coincides and combines the interpretation given by both Wallas and Marksberry. Departing from this approach is Sinnott[2] who believes that operating within the creative process are two methods: the deductive and the spontaneous. The deductive method is the direct approach to solving the problem whereby the creator gathers facts and ideas and deliberately seeks for new relationships between them. The spontaneous method is similar to that of insight. Here the creator, after being immersed in a problem for a period of time, suddenly has a revelation of ideas and solutions.

As an exponent of the Gestalt approach to the theory of creativity, Wertheimer[3] suggests that in the creative process there is first a problem situation where the actual process starts and in which the problem is structurally incomplete. This is followed by the solution situation where the part-whole relationship is maintained, and in which the solution is attained after the structural difficulty has disappeared. He also points out that in some instances the creative process does not have to start with the problem. As with the artist, it may start with the solution situation, but here the inner structural requirements regulate the procedures for the solution.

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[1] Harold Rugg, Imagination: An Inquiry into the Sources and Conditions that Stimulate Creativity (New York: Harper and Row, 1963), p. 6.

[2] Edmond Sinnott, "The Creativeness of Life," Creativity and Its Cultivation, ed. Harold H. Anderson (New York: Harper and Brothers, 1959), pp. 12-29.

[3] Michael Wertheimer, Productive Thinking (New York: Harper and Brothers, 1954), pp. 41-42, 195.

The psychoanalytic and neo-psychoanalytic theorists have also made important contributions to the interpretation of the creative process. The major issues involved in the Freudian approach to creative behavior have been synthesized by Getzels and Jackson:

1. Creativity has its genesis in conflict, and the unconscious forces motivating the creative "solution" are parallel to the unconscious forces motivating the neurotic "solution."
2. The psychic function and effect of creative behavior is the discharge of pent-up emotion resulting from conflict until a tolerance level is reached.
3. Creative thought derives from the elaboration of the "freely rising" fantasies and ideas related to daydreaming and childhood play.
4. The creative person accepts these "freely rising" ideas, the non-creative person suppresses them.
5. It is when the unconscious processes become, so to speak, ego-syntonic that we have the occasion for "achievement of special perfection."
6. The role of the childhood experience in creative production is emphasized, creative behavior being seen as "a continuation and substitution for the play of childhood."[1]

Kris[2] departs from the Freudian approach by attributing the locus of creativity to the preconscious while maintaining the notion that the process of creativity is an ego-regression. The same assumptions are alluded to by Kubie[3] who argues that both the conscious and the unconscious processes act in such a way as to rigidify the preconscious creative process. Creative flexibility is only made possible by the free, continuous, and concurrent action of preconscious processes.

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[1] Jacob W. Getzels and Phillip W. Jackson, Creativity and Intelligence (New York: John Wiley and Sons, Inc. 1962), pp. 91-92.

[2] Ernst Kris, "On Preconscious Mental Process," Psychoanalytical Quarterly, XIX (1950), 551-52.

[3] Lawrence S. Kubie, Neurotic Distortions of the Creative Process (Lawrence: University of Kansas Press, 1958), p. 38.

Another variation to the Freudian approach is expounded by Rugg[1] with his theory of the transliminal chamber. He contends that the mind operates on a continuum along the conscious and unconscious threshold. Creativity occurs at a critical point somewhere between these two areas. When the mind is placed in this transliminal chamber, it becomes free to draw from total life experiences to create new ideas.

Diverting from the psychoanalytic and neo-psychoanalytic formulations of the creative process is the dynamic-perception theory of Schachtel.[2] He places the function of creative behavior within the perceptual framework. Creative performance is not due to an ego-regression or a drive discharge function but to the openness of the individual to the world around him. This openness of creative behavior is the mode of communication between subject and object requiring object-centered or allocentric perception as opposed to the closed subject-centered or autocentric perception.

Mooney[3] also emphasizes the significance of perception as a process for creative behavior. He explains that perception is the process of reading the phenomenon within the environment. Increasing capacity in perception allows for wider reading of the structures of nature and the universe. Involved in such a process man can become more open, more integral, more transacting, and more creative.

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[1] Rugg, op. cit., pp. 42-43.

[2] Ernst Schachtel, Metamorphosis: On the Development of Affect, Perception, Attention and Memory (New York: Basic Books, 1959), pp. 83, 184-88, 241-42.

[3] Ross L. Mooney, "Creation and Teaching," Creativity and College Teaching, ed. E. D. McDaniel, Bulletin of the Bureau of School Services, XXXV, 1953 (Lexington, Kentucky: College of Education, University of Kentucky), pp. 45-62.

On the other hand, creativity for the existential psychologists takes on a new orientation. Maslow[1] conceives of creativity as being synonymous with self-actualization. He sees a creative person as one who is accepting of his primary and secondary processes rather than working through repressive control of forbidden impulses and wishes. In effect, creativity is an epiphenomenon of self-acceptance which stresses the role of inner consistency, unity, and wholeness of person. The individual achieving self-actualization becomes more open to experiences and performs with increased spontaneity and expressiveness.

Following similar lines of interpreting the theory of creativity is Carl R. Rogers. He states that:

> The mainspring of creativity appears to be the same tendency which we discover so deeply as the curative force in psychotherapy--man's tendency to actualize himself, to become his potentialities.[2]

Concomitant to self-actualization is the development of three qualities of creative behavior:

> 1. Openness to experience: existensionality. . . . This means that instead of perceiving in predetermined categories the individual is aware of the existential moment as *it* is, thus being alive to many experiences which fall outside the usual categories.
>
> 2. An internal locus of evaluation. . . . The source or locus of evaluative judgement . . . is, for the

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[1] Abraham H. Maslow, Toward a Psychology of Being (Princeton, New Jersey: D. Van Nostrand Company, Inc., 1962), pp. 127-37.

[2] Carl R. Rogers, "Toward a Theory of Creativity," Creativity and Its Cultivation, ed. Harold H. Anderson (New York: Harper and Brothers, 1959), p. 72.

> creative person, established not by the praise or criticism of others, but by himself.
>
> 3. The ability to toy with elements and concepts. . . . It is from this spontaneous toying and explanation that there arises the hunch, the creative seeing of life in a new and significant way.[1]

To Rogers and Maslow creativity springs directly from the development of the personality which manifests itself in all of life's encounters. The creative individual, then, is a fully functioning person who has the ability to express his ideas and impulses without blockage from internal fears. As a consequence, he can utilize more of his inner potentialities for creative expression.

Each school of thought has its unique language and mode of explaining a theory of creativity and the process by which man expresses his creative behavior. Even under such diverse frameworks there exists a thread of common agreement which credits creativity as a freeing force that exists within man and which helps him explore the world around him in divergent ways.

Structure of the Intellect and Creative Abilities

Guilford's theoretical model for the structure of the intellect has presented a new dimension to the understanding of the creative process and production. Organized into three major structures, the intellect is composed of five operations named as cognition, memory, divergent production, convergent production, and evaluation; four contents identified as figural, symbolic, semantic, and behavioral; and six products defined as unit, class, relation, system, transformation, and implication.

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[1] Ibid., pp. 75-76.

[2] J. P. Guildford, "Three Faces of Intellect," American Psychologist, XIV (1959), 465-79.

Guilford claimed that the abilities most related to creativity are components of divergent thinking and evaluation. According to him, these operations have two exposures: the qualitative and the quantitative. Qualitative production is the flexibility of ideas which have relevance and freedom from rigidity; quantitative output is the fluency with which ideas flow.

In the past two decades, Guilford[1] and his associates, concentrating upon a factor-analytical approach, have claimed to identify seven primary creative abilities utilizing numerous single-factor instruments to assess these traits. Within the operation of divergent thinking and the related content-product factors the following creative abilities have been found: figural, word, and ideational fluency--related to figural, symbolic, and semantic unit; spontaneous flexibility--related to figural, symbolic, and semantic class; associational fluency--related to semantic system; adaptive flexibility (originality)--related to figural and semantic transformation; and elaboration--related to figural, symbolic, and semantic implication. The seventh ability, sensitivity to problems, falls within evaluation of semantic implication.

Paralleling the work of Guilford are the studies in art education conducted by Lowenfeld and Beittel,[2] and Brittain.[3] Eight basic dimensions of artistic creative abilities have emerged from their studies. These are: sensitivity to problems, fluency of ideas, flexibility, originality, redefinition, ability to abstract, ability to synthesize, and coherence of organization. Although the words used by these investigators are, in some cases, different, the concepts related to the factors are generally similar to those derived by Guilford.

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[1] J. P. Guilford, "Progress in the Discovery of Intellectual Factors," Widening Horizons in Creativity, ed. Calvin W. Taylor (New York: John Wiley & Sons, Inc., 1964), pp. 261-97.

[2] Viktor Lowenfeld and Kenneth Beittel, "Interdisciplinary Criteria in the Arts and Sciences: A Progress Report," Research in Art Education, Ninth Yearbook of the National Art Education Association (Kutztown, Pennsylvania: National Art Education Association, 1959), pp. 35-44.

[3] W. Lambert Brittain, "An Experiment Toward Measuring Creativity," Research in Art Education, Ninth Yearbook of the National Art Education Association (Kutztown, Pennvania: National Art Education Association, 1956), pp. 39-46.

Emphasizing the approach-style differentiation in art, Burkhart[1] explored the spontaneous-deliberate criteria. He used spontaneous high to represent the most creative, spontaneous low as creative but limited, deliberate high as non-creative but capable, and deliberate low as non-creative and limited. Spontaneous was defined as the freedom and ease of movement in the use of materials and rendition of forms, and the variety and unpremeditated application of style with a high degree of textural treatment. Deliberate handling was judged to be a static and rigid treatment of materials and forms with a sharp and clean contour delineation. Burkhart found that judgments from art products on this spontaneous-deliberate continuum attained high inter-rater reliability.

Educational Testing Service researchers, Klein, Schulz, and Skager[2] found some discrepancies in the utilization of the spontaneous-deliberate criteria in a study of creative flexibility in art. Judges tended to give high ratings to spontaneous and deliberate artistic products in about equal proportions. The results indicated that art students who received high rating on artistic products were those who preferred to use the spontaneous style, and who were also when required, flexible enough to attain high ratings in the deliberate style. Thus, the relationship of spontaneous as creative and deliberate as non-creative was not supported by the findings.

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[1] Robert C. Burkhart, "The Creativity-Personality Continuum Based on Spontaneity and Deliberateness in Art," Studies in Art Education, II (1960), 43-65.

[2] "Search for Criteria of Artistic Products Fail to Find an 'Open' or 'Closed' Case," ETS Developments, XIV (1967), 2.

As a result of the factor analysis of artistic judgment, Beittel[1] found a criteria grouping under three major dimensions following a bipolar semantic rating procedure: (1) evaluative--represented by a good-bad scale; (2) process-centered--represented by an intuitive-rational, informal-formal, and accidental-controlled scale; (3) discriptive criteria--represented by a masculine-feminine scale. The results showed that judges differed in their ability to agree on the process-centered criteria. This difference was associated with the authoritarian personality structure of the judges.

Taking another approach, Eisner,[2] in a study of children's three-dimensional and two dimensional art products, identified four creative types: Boundary Pushing, Inventing, Boundary Breaking, and Aesthetic Organization. These types were also examined for creative content and form. He explains Boundary Pushing as the process of extending or redefining the limits of common objects or forms. It can also be explained as the ability to achieve the possible by extending the given. By Inventing the creator formulates new objects or forms by restructuring the known or given. Boundary Breaking is defined as a rejection or reversal of accepted formulations. Through insight and imagination the creator is able to establish an order and structure between the gaps that are sensed and the ideas that are generated. Coherence and harmony of elements constitutes Aesthetic Organization. The Content and Form loci are dimensions inherent in each of the creativity types with the exception of Content in Aesthetic Organization. Form is identified as the presence of formal qualities, and Content is identified as the presence of perceived conventional symbols.

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[1] Kenneth R. Beittel, "Factor Analysis of Three Dimensions of the Art Judgment Complex: Criteria, Art Objects, and Judges," Journal of Experimental Education, XXXII (1963), 167-74.

[2] Elliot W. Eisner, "Children's Creativity in Art: A Study of Types," American Educational Research Journal, II (1965), 125-36.

The results of this experiment showed that: the inter-rater reliability of agreement among judges was high enough to warrant investigation between components; the correlation coefficients between creativity types in one medium and creativity types of the other medium were low, median coefficient being .11; significant relationships did occur between types having the same locus; and the creativity type, Boundary Breaking, was perceived much less frequently than the other three types.

Although Eisner has attempted to construct an operational typology by developing a new approach, his components do have a similarity of identification with those of other investigators. Boundary Pushing, Inventing, and Boundary Breaking might be related respectively with Elaboration, Originality, and Redefinition.

Generalized Developmental Curve of Creative Ability

Torrance[1] computed a generalized developmental curve which reflected the different measures used in many of his studies on creative abilities of school children. He showed that from the age of three creativity increased until it reached a peak at about age four and a half. At age five when the child entered kindergarten a slight drop occurred, followed by a rapid growth during first, second, and third grades. At the end of third grade and during the fourth there was a severe slump in creative performance. Another rapid recovery took place during the fifth grade, leveling off slightly at the sixth. Entrance into junior high school at the seventh grade was associated with another decline which was followed again by a recovery at the eighth. The student's performance increased until it reached its height at the eleventh grade leveling off and slightly dropping toward the end of the high school period.

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[1] E. Paul Torrance, Education and the Creative Potential (Minneapolis: The University of Minnesota Press, 1964), pp. 41-42, 74.

Research up to the present time has not provided us with an explanation for this behavior. The rationale has been somewhat speculative, deriving many of the answers from the theoretical domain of social psychology. Torrance, drawing from Sullivan's interpersonal theory, attempts to explain this phenomenon:

> It is interesting to note that each of the generalized drops occurs at an age at which the transition from one developmental stage to another begins. . . . The drop at about age five occurs at the end of the childhood stage and the beginning of the juvenile stage with its demands for social accommodation, compromise, and acceptance of authorities outside of the home. The second drop occurs with the onset of the preadolescent stage with its increased need for consensual validation, peer approval, identification with peers of the same sex, and conformity to peer norms. The third occurs at the onset of early adolescence with its increased anxieties, striving for approval of the opposite sex, and the like, all of which restrict many areas of awareness and impose new demands for conformity.[1]

Torrance[2] also elaborated that the slumps occurring at the various stages may be caused by a high degree of discontinuity factors within schools. One element of discontinuity may be found in the changes that occur from kindergarten through twelfth grade in the way children are organized for instructional purposes. An example of this, in most cases, is the transition from the self-contained classroom in the elementary school to the block-time module in the junior high school to the subject-matter grouping in the high school.

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[1] Ibid., p. 75.

[2] Ibid., pp. 77-88.

Another element of discontinuity may be related to the curriculum. The transition from the development of skills in early elementary education to the application of skills within the subject-matter development of later elementary education may be a factor causing the drop in creativity of fourth-grade children.

Classroom instruction seems to become more organized and formalized as children enter the different phases of their educational progress. These curricular changes from elementary to junior high and from junior high to senior high may be more acute at the points of transition. As a result the sensitivity of creative expression may be reduced, causing a similar slump during the seventh grade.

Van Pelt's[1] study appears to support a portion of Torrance's findings. An analysis of interrelatedness showed that significant relationships existed between chronological age and creativity when fourth-, fifth-, and sixth-grade students were tested on the Minnesota Tests of Creative Thinking.

An extension of Torrance's studies was made by Bednar and Parker.[2] Testing college freshmen, sophomores, and juniors, the investigators showed that the creativity mean scores for each grade level decreased with respect to each creativity factor as the grade level increased.

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[1] Bobby Newell Van Pelt, "A Study of Creativity and Other Selected Variables as Related to Academic Achievement in the Upper Elementary Grades" (unpublished Ed.D. dissertation, University of New Mexico, 1965).

[2] R. L. Bednar and C. A. Parker, "The Creative Development and Growth of Exceptional College Students," The Journal of Educational Research, LIX (1965), 133-36.

In other words, creativity performance of college students decreased from freshman through junior year.

Analyzing children and adult art work on the basis of creative imagination, aesthetic quality, and developmental level, Kincaid[1] discovered that a tendency existed for children's creative imagination to increase up to the age of fourteen, and then decline. This phenomenon differs from the results brought out by Torrance where the peak level of creativity occurred at the age of sixteen. The differences existing between these two findings may be related to Torrance's predominant use of verbal creative factors.

Differences between Individual and Group Creativity

Zagona, Willis, and MacKinnon[2] in their review of experiments comparing individuals to groups in creative problem solving ability concluded that the evidence shown appeared to favor group creativity over that of the individual. Although the writer does not profess to have made an exhaustive investigation of the findings, he does, however, find it difficult to draw the same conclusion as Zagona, *et al*. The problem that the writer sees is the diversity of approaches and factors with which investigators have researched the creative dimensions of individual and group performances. The following studies will reflect this difficulty.

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[1] Clarence E. Kincaid, "The Determination and Description of Various Creative Attributes of Children" (unpublished Ed.D. dissertation, The Pennsylvania State University, 1960).

[2] S. V. Zagona, J. E. Willis, and W. J. MacKinnon, "Group Effectiveness in Creative Problem-Solving Tasks: An Examination of Relevant Variables," *Journal of Psychology*, LX (1966), 111-37.

Studies conducted by Parnes[1] and his associates showed that when deferred-judgment procedures were used with groups, these groups were significantly more productive of creative ideas than individuals using conventional methods of creative thinking.

Also using deferred-judgment principles, Arici[2] examined individual and group creative thinking ability under two creative thinking methods--brainstorming and non-brainstorming. The investigator discovered that individuals produced greater numbers of solutions than did the groups. Individuals under the brainstorming method also produced a significantly greater number of solutions than their counterpart under non-brainstorming methods. Comparisons made with respect to quality of solutions, however, showed that even though individuals produced higher quality solutions than groups, these differences were not significant.

Following similar lines, Dunnette, Campbell, and Jaastad,[3] using research scientists and advertising personnel, found that individuals produced not only a larger quantity of ideas but also surpassed the group on quality of ideas. The quantity and quality of individual production over that of the group was relatively greater when individual involvement was preceded by group participation.

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[1] Sidney J. Parnes, "The Literature of Creativity (Part II)," The Journal of Creative Behavior, I (1967), 197.

[2] Hasnu Arici, "Brainstorming as a Way of Facilitating Creative Thinking" (unpublished Ed.D. dissertation, University of Illinois, 1964).

[3] M. D. Dunnette, J. Campbell, and K. Jaastad, "The Effect of Group Participation on Brainstorming Effectiveness for Two Industrial Samples," Journal of Applied Psychology, XLVII (1963), 30-37.

Lindgren and Lindgren,[1] also making individual and group comparisons, explored the effect of creative production by placing the subjects through three brainstorming stages. In the first stage, the subjects were allowed to brainstorm individually; in the second stage they performed brainstorming in small groups; and in the third stage they again brainstormed as individuals. The level of creative performance was higher in the third stage than any of the performances of the two previous stages. The number of responses produced in the third stage, however, was significantly higher for women than for men.

On the other hand, Taylor, Barry, and Block[2] derived different results when comparing individuals creative thinking with that of groups. They divided forty-eight undergraduates into twelve groups of four and compared them with forty-eight other subjects on individual performance. The mean score produced by the groups was significantly greater than the mean score produced by the individuals.

The above studies have dealt mainly with adult creative performances, whereas Speigal's[3] study investigated creative behavior in school children. He designed his study to test the hypothesis that groups solve complex problems more successfully than individuals because groups develop more information about possible solutions. His findings confirmed his hypothesis. Thus, he concluded that individuals, hampered by their solution sets, work with restricted amounts of information.

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[1] H. C. Lindgren and F. Lindgren, "Brainstorming and Orneriness as Facilitators of Creativity," Psychological Reports, XVI (1965), 577-83.

[2] D. W. Taylor, P. C. Berry, and C. H. Block, "Does Group Participation When Using Brainstorming Facilitate or Inhibit Creative Thinking?" Technical Report No. 1, prepared under Contract No. 609(2) (NR 150-166) for Office of Naval Research (New Haven, Connecticut: Yale University, 1957).

[3] Joseph Speigal, "A Quality of Solution of a Tactical Field Problem as a Function of the Amount of Information Elected by the Groups and Individuals" (unpublished Ph.D. dissertation, Columbia University, 1960).

Spraker,[1] also working with school children, presented data from his study which did not agree with any of the above studies. When testing to see if individuals or groups could produce more creative solutions to problems in mathematics, he discovered that there were no significant differences between the creative scores produced by groups and the creative scores produced by individuals when these scores were adjusted for IQ and arithmetic achievement.

A different method of investigation was used by Triandis and his associates when researching the creative behavior of individuals and groups. Their studies examined the creative abilities of members within groups in order to predict the creative abilities of groups. From three separate studies, Triandis, Bass, Ewen, and Mikesell,[2] in an attempt to explore the improvement of multiple R by consideration of the individual creativity scores, discovered that from 22 per cent to 72 per cent of the variance of the dyad scores could be predicted from the individual creative abilities of the two participants. However, these predictions could not be improved by only considering the interaction between the scores of the individuals. In one experiment where the procedure was used to determine the relative dominant and non-dominant subject, the correlations of the abilities of the dominant member with group performance were higher than those of the abilities of the non-dominant member with group performance. Consequently, the investigators concluded that should a larger number of subjects be used, the expected correlations between group and individual performance would be less similar and significant differences may result.

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[1] Harold Stephen Spraker, "A Study of the Comparative Emergence of Creative Intellectual Behavior During the Process of Group and Individual Study of Mathematics" (unpublished Ph.D. dissertation, University of Virginia, 1960).

[2] Harry C. Triandis, Alan R. Bass, Robert B. Ewen, and Eleanor H. Mikesell, "Team Creativity as a Function of the Creativity of the Members," _Journal of Applied Psychology_, XLVII (1963), 104-10.

In another study dealing with attitudes and creative homogeneity and heterogeneity of dyad members, Triandis, Hall, and Ewen[1] found that dyadic groups whose members are heterogeneous in their attitudes and homogeneous in their abilities are more creative than those groups that are heterogeneous or homogeneous in both attitudes and creative abilities. Additional findings showed that training in the other person's point of view could improve the dyadic creativity of heterogeneous dyads, and the more creative the members of a dyad, the higher the dyadic creativity.

The effect on group creativity of various characteristics attributed to an influential member has been explored within recent years. Fiedler and Neuwese[2] have studied the relationship between leader's intelligence and group creative performance under cohesive and uncohesive conditions. The results indicated that the intelligence of the leader is a better predictor of creative performance in cohesive groups than in uncohesive groups.

The perception and attitudes of the leader toward disagreement among members in a creative problem-solving situation was investigated by Maier and Hoffman.[3] The outcome of the study showed that where leaders most often report having problem participants, group acceptance was very low and the solutions were least innovative. In contrast, where leaders looked upon their members as possessing creative ideas, group satisfaction was high and innovative solutions increased in the interaction.

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[1] Harry C. Triandis, Eleanor R. Hall, and Robert B. Ewen, "Members Heterogeneity and Dyadic Creativity," Human Relations, XVIII (1965), 33-35.

[2] F. E. Fiedler and W. A. T. Neuwese, "Leader's Contribution to Task Performance in Cohesive and Uncohesive Groups," Journal of Abnormal and Social Psychology, LXVII (1963), 83-87.

[3] N. R. F. Maier and L. R. Hoffman, "Acceptance and Quality of Solutions as Related to Leader's Attitudes Toward Disagreement in Group Problem Solving," Journal of Applied Behavorial Science, I (1965), 373-86.

In a study by Anderson and Fiedler[1] assessing the effect of the participatory and supervisory leadership on group creativity, the investigators found that groups having participatory leaders were generally superior in quantity of output while groups having supervisory leaders were superior in quality of production.

Under the condition where conflict is established by increasing the resistance of subordinate participants of a group by exposing the group to a creative solution provided by a member who is in an authority position, Hoffman, Harburg, and Maier[2] discovered that when so exposed, there is an increase in the creative quality output of the group.

Most of the studies concerning individual and group creativity reviewed in this part of the chapter have only treated the aspect of verbal creativity. With the exception of Spraker's study where creative production was non-verbal mathematical solutions, there have been no studies published, to the writer's knowledge, comparing individuals and groups on the dimension of non-verbal artistic creativity.

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[1] L. R. Anderson and F. E. Fiedler, "The Effect of Participatory and Supervisory Leadership on Group Creativity," Journal of Applied Psychology, XLVIII (1964), 227-236.

[2] L. R. Hoffman and E. Harburg, and N. R. F. Maier, "Differences and Disagreement as Factors in Creative Group Problem Solving," Journal of Abnormal and Social Psychology, LXIV (1962), 206-14.

Difference between Male and Female Creativity

The American culture has developed within its framework certain expectations that condition the behavior of individuals. The expected sex-role function is one such dimension. From birth, children are reared within the family structure to abide by designated responsibilities and involvements which are identified as male and female operations. This dichotomy of sex role expectations and behavior has been seen by investigators of behavioral sciences as a thwarting force to the productivity of some potentially creative people.

A call to reduce the emphasis on this cultural determinant has been made by those who are interested in fostering the creative spirit of children within an educational setting. Torrance has made evident such a need. He professes that:

> The creative potential of both boys and girls are being frustrated by misplaced emphasis. For years we have been puzzled by the superiority of girls over boys during the early school years and by the superiority of men over women in science, invention, musical composition, art, and other high achievements. . . . As we make progress in releasing the creative potential of school children, we shall eliminate much of the present social conflict concerning masculine and feminine values. For example, creativity requires both a high degree of sensitivity and a high degree of independence of mind. Sensitivity has a distinctly feminine character in our society; independence, a distinctly masculine character. Thus, the highly creative boy suffers because he appears more effeminate than his peers and the highly creative girl suffers because she appears more masculine than hers.[1]

Working under this assumption that cultural pressures tend to place certain kinds of creative experiences off limits for males and females, Torrance[1] asked third, fourth, and fifth graders to check from a list of one hundred creative activities those activities which they had initiated on their own. Some general areas showed sex differences. Males displayed greater inhibitions in creative writing, dance, and the arts; females avoided involvement in science exploration, creative construction and crafts.

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[1] Torrance, _op_. _cit_., pp. 13-14.

In another study using the product-improvement technique, Torrance[2] elicited responses from first-, second-, and third-grade pupils. The nurse's kit was used as a feminine toy, the fire truck as a masculine toy, and the toy dog as a stimulus unrelated to sex. First-grade males produced fewer responses to the nurse's kit and more to the fire truck. The females, on the other hand, gave fewer responses to the fire truck and more to the nurse's kit. In the second grade, a comparison of responses from males and females showed that while males had increased their responses to the toy truck, females had decreased their responses to the nurse's kit. By the third grade, the responses of males to all three toys were superior to those of females.

When testing his premise that the degree of manipulation of objects designed to evoke creative thinking would be related to the quantity and quality of responses, the results revealed that males tended to participate more in manipulation than females, although this tendency did not appear to be significant until the second grade.

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[1] E. Paul Torrance, Rewarding Creative Behavior (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1965), pp. 112-19.

[2] Torrance, Education and the Creative Potential, pp. 103-18.

Different results were found by May and Tabachnick[1] when investigating the creative writing abilities of third- and sixth-grade children under three stimuli conditions. The three stimuli conditions were: (1) observation of a representational drawing, (2) a non-object drawing, and (3) a choice of either drawing. There were no significant differences in the overall creative performance of males and females at the third-grade level. At the sixth-grade level, on the other hand, the overall creative performance of females was significantly better than that of the males. Similar findings were also made evident with sixth-grade subjects in the studies of Eisner[2] and Khieralla.[3]

Dealing with older children, Torrance[4] compared thirty-five males and forty females from seventh and eighth grades whose IQ scores were 135 and above on fifteen measures of creative ability. There were significant differences at the .05 level in five of the fifteen measures--four favored males and one favored females. The measures which significantly favored males were mainly non-verbal abilities, whereas the measure which favored females was in the verbal ability area. Hutchinson[5] also found males to be significantly more creative than females at the seventh-grade level. Ashe,[1] testing eleventh-grade students, achieved statistically significant sex defferences that supported the hypotheses that males would show larger increases in creative ability than females.

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[1] Frank B. May and B. Robert Tabachnick, "Three Stimuli for Creative Writing," The Elementary School Journal, LXVII (1966), 88-94.

[2] Eisner, op. cit., p. 135.

[3] Sayed Mohamed Hassan Khieralla, "The Relationship between Creativity and Intelligence, Achievement, Physical Growth, Certain Personality Traits, and Certain Reading Habits" (unpublished Ph.D. dissertation, The University of Michigan, 1963).

[4] Torrance, Rewarding Creative Behavior, pp. 128-29.

[5] William Lloyd Hutchinson, "Creative and Productive Thinking in the Classroom" (unpublished Ed.D. dissertation, University of Utah, 1963).

Using the Southern California Test of Creative-Thinking Abilities on students at the seventh-grade level, Neufeld[2] found statistically significant differences in favor of females over males on word fluency, ideational fluency, expressional fluency, and the average creativity index. In his study, Khieralla,[3] also using the Southern California Test of Creative-Thinking Abilities, found females to be far superior to males at the eighth, tenth, and twelfth grades. Assessing non-verbal artistic creative production on four judgmental criteria by using six different art tasks, Barrett[4] supported the above findings by discovering that females were significantly superior to males at the ninth-grade level.

Supporting the findings that there are no sex differences in creative abilities of junior high school and high school students are studies conducted by Dacey and

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[1] Margaret Ruth Berry Ashe, "A Study of Change Measured Personality Adjustment and Release of Creativity through Freedom of Expression in Writing" (unpublished Ph.D. dissertation, University of Texas, 1964).

[2] Joseph John Neufeld, "The Relationship of Creative Thinking Abilities to the Academic Achievement of Adolescents" (unpublished Ph.D. dissertation, University of Denver, 1964).

[3] Khieralla, op. cit.

[4] Harry O. Barrett, "Sex Differences in Art Ability," The Journal of Educational Research, XLIII (1950), 193-97.

Ripple,[1] Castle,[2] Alshin,[3] and Guilford, Merrifield and Cox.[4]

When investigating the Creative art expression of seventh- and eighth-grade students on two-dimensional and three-dimensional tasks, Teed[5] also found no significant differences between the creative art performances of males and females.

Conflicting findings were presented in the following four studies when considering creative thinking of adults. Hoffman and Maier[6] presented results which showed that over twice the percentage of male participants as compared to females gave correct responses to creative problem-solving tasks. Using the Guilford battery, Abel-Razik[7] discovered that females outranked males in creative thinking abilities. Females significantly outranked males on creative brainstorming in a study conducted by Lindgren and Lindgren.[1] Gumeson,[2] using the same battery, reported no sex groups differences among all the comparisons of high and low creative males and high and low creative females.

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[1] John Dacey and Richard Ripple, "Relationships of Some Student Characteristics and Verbal Creativity," Paper read at the Annual Meeting of the American Educational Research Association, New York City, February 16-18, 1967.

[2] A. D. Castle, "A Comparison of the Creativity of Urban and Rural Students in Oklahoma" (unpublished Ed.D. dissertation, University of Oklahoma, 1965).

[3] George Max Alshin, "The Relationship among Selected Variables and Level of Creativity" (unpublished Ed.D. dissertation, University of Georgia, 1963).

[4] J. P. Guilford, P. R. Merrifield, and Anna B. Cox, "Creative Thinking in Children at the Junior High School Level," Mimeographed Report, University of Southern California, 1961.

[5] Harry Truman Teed, "The Relationship of the Two-Dimensional and Three-Dimensional Creative Art Expression of the Adolescent" (unpublished Ed.D. dissertation, The Pennsylvania State University, 1962).

[6] L. R. Hoffman and N. R. F. Maier, "Sex Differences, Sex Composition, and Group Problem Solving," Journal of Abnormal and Social Psychology, LXIII (1961), 453-56.

[7] Taher Mohamed Abdel-Razik, "An Inventory of Creative Thinking among College Students" (unpublished Ph.D. dissertation, The Ohio State University, 1963).

Eisner[3] conducted an extensive survey of art students in four-year high schools and four-year colleges to gather information about their knowledge of creative art activities. He administered his art information inventory to 1,485 students enrolled in eighteen institutions within six states. The outcome of his survey revealed that females were significantly more informed than males about creative art activities. This difference appeared at each of the eight grades tested. To explain this phenomenon, Eisner states that:

> Given a group of boys and girls of equal intelligence, why should girls receive higher scores on information about art than boys? It seems that the culture in which we live tends to view artists and artistic interests as something less than masculine--perhaps even effeminate. Children probably pick up this culture bias quite early, and it may become important to boys especially during adolescence when they are most concerned with their masculinity.[4]

The lack of consistent evidence in the above studies could also in part be due to the lack of consistency in the types of creative abilities tested, and in part to the different methodologies, procedures, and testing instruments.

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[1] H. C. Lindgren and F. Lindgren, op. cit.

[2] George Gerald Gumeson, "A Comparative Analysis of the Needs, Values, Cognitive Abilities, and Other Personality Characteristics of High and Low Creative Junior College Students" (unpublished Ph.D. dissertation, University of Denver, 1963).

[3] Elliott W. Eisner, "The Development of Information and Attitude toward Art at the Secondary and College Levels," Studies in Art Education, VIII (1966), 43-58.

[4] Ibid., pp. 45-46.

Differences between Creativity of Art and Non-Art Students

Art educators, in general, agree that experiences in art are in themselves creative experiences. If this assumption is true, then how can experiences in art increase an individual's creative performances, and how can creativity as a result of art experiences be transferable to other creative experiences? The following research studies are attempts at answering some of these questions.

Even[1] exposed a sampling of eleventh-grade students, who were in the upper 25 per cent of their class academically, to art training and experiences in order to assess if there would be any growth in creativity as a consequence of their art education. When the art training group was compared with the non-art training group, the art group showed gains of statistical significance in creative flexibility and originality on the Minnesota Tests of Creative Thinking, whereas the non-art group did not.

An experimental attempt to determine if creative-productive thinking could be developed by incorporating creative-problem solving experiences into a high school industrial arts program was carried out by Meitus.[2] Students in a creatively taught industrial arts class were compared to similar students in a conventionally taught arts class. The creative ability gains of the experimental group were significantly greater than those of the control group.

Similar findings have been reported by several investigators when college students have been the subjects.

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[1] Robert Lawrence Even, "An Experimental Study of the Comparative Effect of Selected Art Experiences on the Creative Performance and Attitudes of Academically Superior Students" (unpublished Ph.D. dissertation, University of Minnesota, 1963).

[2] Walter Stanly Meitus, "An Experiment in Development of Creative Thinking and Its Effect on Selected Cognitive Affective and Psychomotor Behaviors of Students in High School Industrial Arts Courses" (unpublished Ed.D. dissertation, Loyola University, 1966).

Roderick,[1] after administering the Minnesota Tests of Creative Thinking to freshman music majors, art majors, and randomly selected freshman from other areas, found that art majors scored significantly higher on five of the eight measures of creative ability than did music majors and other non-art students. Stapp[2] also reported the superiority of art students over non-art students on several tests of creative ability.

Meinz,[3] taking elementary education majors who had undergone instruction in art education and comparing them with elementary education majors who had been involved in industrial arts education, discovered that students with art education training had made significantly greater gains in creative performance than students with industrial arts education on a General Creativity Battery administered at the beginning and at the end of the semester.

An experiment designed to study the gains of creativity through art education and the transfer of such training in creativity to poetry writing was conducted by Frankston.[4] One hundred and three eighth-graders were allowed to produce three art and poetry products at the beginning and at the end of one semester. A comparison of these products revealed no significant gains in creative art performances and creative writing performance between those students taking art and those not taking art. These results lead the investigator to the conclusion that no transfer of creativity took place from art to poetry. Nonetheless, the investigator pointed out that such a conclusion should be taken with reservation and that a better control of the variables could produce different results.

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[1] James Leroy Roderick, "An Investigation of Selected Factors of the Creative Thinking Ability of Music Majors in a Teacher Training Program" (unpublished Ed.D. dissertation, University of Illinois, 1965).

[2] Ray V. Stapp, "Relationship of Measures of Creativity, General Intelligence, and Memory" (unpublished Ed.D. dissertation, The Pennsylvania State University, 1963).

[3] Algalee Pool Meinz, "General Creativity of Elementary Education Majors as Influenced by Courses in Industrial Arts and Art Education" (unpublished Ed.D. dissertation, The Pennsylvania State University, 1960).

[4] Leon Frankston, "Some Explorations of the Effect of Creative Visual Art Experiences upon the Poetry Writing Quality of Eighth-Grade Students" (unpublished Ed.D. dissertation, Columbia University, 1963).

There is, however, common agreement among the studies presented, with the exception of the Frankston investigation, that art education has positive effects on the development of general creative abilities. How these abilities are used by individuals under transfer situations is an aspect that needs further intensified exploration.

Differences between Creativity and Intelligence

A concern for the clarification of the relationship between creativity and intelligence has not only generated considerable research, but it has also created an expanding climate of controversy. The conflicting results in reported studies may be attributed to a lack of systematic procedures in identifying and measuring factors of creative thinking.

One of the first attempts at investigating this problem was made by Getzels and Jackson.[1] They found that for a population of private school students of seventh through twelfth grades with a mean IQ of 132 and a standard deviation of 15 that the correlation between IQ and creative thinking abilities was relatively low, ranging from .13 to .39 for males, and .12 to .39 for females.

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[1] Getzels and Jackson, op. cit., pp. 13-22.

Torrance[1] undertook eight partial replications of the Getzels and Jackson investigation. Five of the replications were constructed at the elementary level, one at the high school level, and two at the graduate level. The mean mental ability scores of the elementary subjects ranged from 114 to 152 for the mental ability groups and 98 to 127 for the creative groups. The high school subjects had mean mental ability scores of 142 for the mental ability group and 122 for the creative group. On the graduate level the mean scholastic ability scores were 69 and 72 for the scholastic ability groups and 45 and 50 for the creative groups.

Torrance found correlations between the two groups to be: .17 with the Stanford-Binet, .24 with the California, .26 with the Kuhlmann-Anderson, .32 with the Otis, and -.02 with the Miller Analogies for one graduate group and .11 with the other. The relatively low correlations supported the findings of the Getzels and Jackson study.

Wallach and Kogan[2] also raised the question in their study: is creativity a unique kind of individual excellence or is it an aspect of general intelligence? By grouping fifth-grade children into high creative and high IQ, high creative and low IQ, the data yielded three major findings. First, children who tended to score at the high end of one intelligence test tended to score high on other intelligence tests; second, children who scored high on one creativity measure tended to score high on all other creativity measures; third, the indices of creativity used tended to be independent of the indices of intelligence. Thus, the results support the view that, in school children, creativity is a different type of cognitive excellence than general intelligence. They also concluded that their construct of creativity possessed an internal consistency similar to that of general intelligence.

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[1] E. Paul Torrance, "Educational Achievement of the Highly Intelligent and the Highly Creative: Eight Partial Replications of the Getzels-Jackson Study," Research Memorandum BER-60-18, Bureau of Educational Research, University of Minnesota, September, 1960.

[2] Michael A. Wallach and Nathan Kogan, "Creativity and Intelligence," Trans-action, IV (1967), 38-43.

Kheiralla[1] showed significant relationships between overall creative ability and intelligence for grades six, eight, ten, and twelve with coefficients ranging from .31 to .54. The coefficients for the fourth-grade were not significant.

When comparing the art qualities, creative abilities and intelligence of second, fourth, and sixth graders, Mosteller[2] found total art qualities to be significantly correlated with total creative abilities with a mean correlation coefficient of .60, but discovered creativity to have a low correlation of .28 with intelligence. Likewise, Eisner[3] reported low correlations between artistic creativity and the Stanford-Binet. In no single case did significant relationships appear between the scores of the two assessments given to sixth graders.

In accordance with Kheiralla, Altenhaus[4] reported findings that indicated a significant linear relationship between creativity and IQ when sixth-grade students whose scores fell within the top 20 per cent on measures of creativity were analyzed and compared with students whose scores fell within the top 20 per cent on measures of IQ.

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[1] Kheiralla, op. cit.

[2] Polly Ruth Mosteller, "The Qualities of Art Expressed in Children's Paintings in Relation to Other Measures of Their Abilities, Achievements and Adjustment" (unpublished Ed.D. dissertation, Wayne State University, 1963).

[3] Eisner, American Educational Research Journal, pp. 125-36.

[4] Corrine Batlin Altenhaus, "An Exploration of the Relationship of Intelligence to Creativity in School Children" (unpublished Ed.D. dissertation, Rutgers State University, 1964).

These findings differed somewhat from those of Getzels and Jackson. De Boer[1] also found a significant positive relationship with a correlation coefficient of .55 between creativity and mental ability in sixth-grade students.

By dividing his seventh graders into high, average, and low groups on the basis of IQ, Spraker[2] reported significantly higher creativity scores achieved by the high groups when compared to the average and low groups. He found a positive correlation of .59 between creativity and IQ. Correlations reported by Gardner[3] tended to be highly significant for seventh graders.

When relating mental ability scores to total creativity scores, Dacey and Ripple[4] attained a relatively low, yet statistically significant correlation coefficient of .23. The mean correlation, however, between creativity and mental ability was only .19. Data obtained by Spector[5] from his seventh graders, on the other hand, indicated that measures of mental ability are independent of creative dimensions.

Ginsburg,[6] in testing a sampling of boys in early adolescence, found creative abilities to be independent of intelligence in the higher ranges of intelligence and dependent upon intelligence in the dull and moderately bright ranges.

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[1] Dorothy Louise De Boer, "A Study of the Relationship of Creativity to Intelligence and Achievement" (unpublished Ph.D. dissertation, Northwestern University, 1964).

[2] Spraker, op. cit.

[3] Sheldon Frank Gardner, "Creativity in Children: A Study of the Relationship between Temperament Factors and Attitude Factors Involved in the Creative Ability of Seventh Grade Children with Suggestions for a Theory of Creativity" (unpublished Ph.D. dissertation, University of Southern California, 1963).

[4] Dacey and Ripple, op. cit.

[5] Norman Spector, "Factorial Dimensions of Creativity" (unpublished Ph.D. dissertation, University of Texas, 1963).

[6] Gerald Phillip Ginsburg, "Creative Potential and Childhood Antecedents" (unpublished Ph.D. dissertation, The University of Michigan, 1964).

Barbarouse[1] found IQ not correlated significantly with any creative ability totals from a sample of eighth-grade students. For ninth and tenth graders, Madaus[2] reported that the verbal and non-verbal components of the Minnesota Tests of Creative Thinking are independent of intelligence as measured by The School and College Ability Tests. The correlations computed ranged from .01 to .16.

The findings of a study conducted by Madeja[3] with high school students showed that intelligence and verbal creativity have a strong positive relationship even though intelligence and non-verbal creativity have little relationship. Art abilities, however, did not correlate with the non-verbal abilities of the Minnesota Tests of Creative Thinking. These findings differ partially from those of Mosteller. Moreover, no relationship exists between verbal and numerical ability and creative art ability of secondary school children as reported by Woods.[4] Reviewing the literature on the relationship of the two abilities, Guilford summarized his findings by reporting that:

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[1] Eleanor H. Barbarouse, "An Investigation of the Variability of Eighth Grade Students' Behavior Responses on Creativity Criteria, Intelligence, and Sociometric Choices in Relation to Their Jungian Psychological Types" (unpublished Ed.D. dissertation, Auburn University, 1965).

[2] George F. Madaus, "Divergent Thinking and Intelligence: Another Look at a Controversial Question," Paper read at the Annual Meeting of the National Council on Measurement in Education, New York City, February 16-18, 1967.

[3] Stanley Stephen Madeja, "Comparison of Two Methods of Teaching Art Students of High and Low Art Ability" (unpublished Ph.D. dissertation, University of Minnesota, 1965).

[4] Walter Abner Woods, "Visual Form-Space Manipulation and Its Relation to Art Participation" (unpublished Ph.D. dissertation, Columbia University, 1952).

> The relation of creative potential and creative production to the traditional IQ has been found close to zero where superior IQ's are concerned. This finding has been verified by a number of investigators. . . . But in the lower ranges of IQ there is a substantial correlation. When the whole range of IQ is included, say from 62-150, there is a characteristic scatter plot. This plot shows that when the IQ is low, scores on tests of creative potential can only be low. When the IQ is high, there can be a wide range in performance on creativity tasks.[1]

Many of the studies reported here support the view that creative ability is a different type of cognitive excellence than general intelligence. Only a few, however, fall within the scheme delineated by Guilford.

Differences between Creativity and Socio-Economic Status

Among the many studies on creativity, the ones that have investigated the effects of cultural environments, as a reflection of socio-economic status, on the creativity of individuals have been relatively few. A moderate increase, however, of this interest has appeared in studies of recent years.

One such study was reported by Savoca.[2] Categorizing four-year old white and Negro preschool children into high and low socio-economic groups and testing them orally on four divergent thinking factors identified by Guilford, Savoca found that the high socio-economic groups scored significantly higher than did the low socio-economic groups. The investigator concluded that cultural deprivation, defined as the environmental conditions resulting from the occupation and education of the head of the household, has a tendency to handicap creative thinking in young children.

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[1] J. P. Guilford, "Creativity: Yesterday, Today and Tomorrow," The Journal of Creative Behavior, I (1967), 9.

[2] Anthony F. Savoca, "The Effects of Reward, Race, IQ and Socio-Economic Status and Creative Production of Preschool Children" (unpublished Ph.D. dissertation, Louisiana State University, 1965).

Yet Freyberger[1] who conducted her investigation in the elementary school found no difference in the creativity of art drawings executed by first- through sixth-grade children who had come from different socio-economic and ethnic backgrounds.

After administering the Minnesota Tests of Creative Thinking to two hundred fifth-grade students, Dukes[2] showed that with tasks of verbal creativity on factors of fluency, flexibility, and originality, students from upper-middle and lower-middle levels achieved significantly higher scores than students from upper-lower and lower-lower levels. With tasks of non-verbal creativity on factors of originality, students from the upper-middle levels achieved significantly higher scores than students from upper-lower and lower-lower levels. No significant differences, however, were found among the various socio-economic levels with tasks of non-verbal creativity on factors of fluency, flexibility, and elaboration.

Sixth graders, on the other hand, behaved differently in a study conducted by Baker,[3] where students were given creative writing tasks motivated by audio, visual, olfactory, tactile, and verbal stimuli. Correlations were computed between the indices of socio-economic status and the identified stimuli. The investigator concluded from his findings that indices of socio-economic status have a low validity for predicting the degree of creativity for any of the motivational factors.

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[1] Ruth M. Freyberger, "Differences in the Creative Drawing of Children of Varying Ethnic and Socio-Economic Backgrounds in Pennsylvania Based on Samplings of Grades One Through Six," Research in Art Education, Seventh Yearbook of the National Art Education Association (Kutztown, Pennsylvania: National Art Education Association, 1956), pp. 115-25.

[2] Ben Marshall Dukes, "Anxiety, Self Concept, Reading Achievement, and Creative Thinking in Four Socio-Economic Status Levels" (unpublished Ed.D. dissertation, University of Alabama, 1964).

[3] Marvin Glenn Baker, "Motivation for the Release of Creativity through Creative Writing" (unpublished Ed.D. dissertation, Ball State Teachers College, 1963).

In a similar vein, Rambo[1] discovered that junior high school students who had been given the Minnesota Tests of Creative Thinking and who were grouped as high in creativity did not differ from those who were grouped as low in creativity in regard to socio-economic status.

Five creativity tasks were selected by Castle[2] from those used by Getzels and Jackson in their study. These were given to students from ninth through twelfth grades. The results did not warrant the investigator rejecting the hypothesis that there are any significant differences in creativity of students with different socio-economic backgrounds.

Concerned with a unique population, Kelson[3] tested the assumption that retarded children from culturally advantaged environments could score higher on verbal and nonverbal creative productions than retarded children from culturally disadvantaged environments. She found this to be partially true. By analyzing the results from the Minnesota Tests of Creative Thinking, Kelson concluded that upper-class retarded children scored significantly better than lower-class retarded children in verbal creativity only; significant differences were not found with nonverbal creative tasks.

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[1] Florence Lasseter Rambo, "Pupil Characteristics Related to Creativity" (unpublished Ed.D. dissertation, University of Georgia, 1964).

[2] Castle, op. cit.

[3] Florence Kelson, "An Assessment of Creativity in the Retarded Child" (unpublished Ph.D. dissertation, Yeshiva University, 1965).

In general, the above studies seem to support the assumption that individuals of all school ages from different socio-economic backgrounds do not differ in their creative performances. Preschool children and exceptional children, in accordance with the findings, appear to differ from this behavior. The study of fifth-grade children favored the middle class on verbal creative thinking only.

Summary

The theories and definitions of creativity that have been presented in the literature mean a multitude of things. In some instances creativity has been explained as a set of characteristics attributed to a creative person; in other cases it has been dealt with as a motivation or process. Most often it has been related to an end product as a manifestation of creative behavior. Whichever way creativity has been treated, theorists, researchers and practitioners have shown a considerable diversity in its interpretation.

Those theorists who have defined creativity as a process conceive of the act as undergoing various overlapping stages, identified generally as preparation, incubation, illumination, and verification. As a Gestalt concept, creativity functions as a perceptual configuration. For the psychoanalysts, it is either a conflicting force housed in the unconscious when eventually gives rise to fantasies and childhood play, or it is a constructive force within the twilight zone hovering between the unconscious and the conscious which awaits liberation to explore new ideas. To the existential-oriented psychologists creativity is the process of self-actualization.

Common among these diversities, nonetheless, is a subtle concantenation of abstract meanings that acknowledges creativity to be a generating energy which gives an extra impetus to life. When activated, it releases within man the freedom to explore relatively unknown realms which unfold new elements, new relationships, and new concepts.

The most intensive investigations which are attempting to identify creative abilities and criteria for assessment are being conducted by Guilford and his associates. Other investigators have inquired into the aspect of non-verbal creative artistic abilities. On this dimension no common criteria have been developed and consistently used by all investigators.

The findings of the research studies reviewed in this chapter are summarized in the following statements:

1. The generalized developmental curve of Torrance's shows that there is an increase in creative production from pre-school to twelfth grade. The curve, however, is not uniform, but shows various dips in its development. These dips occur during kindergarten, fourth grade, seventh grade, and the last year in high school.

2. Two types of studies concerning the creativity of individuals and groups have been reported in this chapter. One set of investigators dealt with a comparison of individual creativity with that of the group. Although reviewers of such investigations have concluded that research in general favors group creativity as being superior to that of the individual, the research does not strongly support the generalization. The difficulty of drawing such a conclusion is made evident by the diversity of approaches and criteria used to measure the creativity of individuals and groups. The other investigations have explored the influence of individual members on the creativity of the groups as a means of predicting group productivity. Investigators generally agree that after assessing

the ability of each member and processing the data with appropriate statistical procedures, the predictability of the group's creative performance can be reliably ascertained.

3. A majority of the reported studies found no significant differences between creativity of males and females. However, those studies which indicated that females were superior to males had a slight edge over those that favored males. Torrance and Eisner explain this phenomenon as a result of cultural bias. There are certain delegated activities to each of the sexes that are acceptable within American culture. On involvements that have a creative-aesthetic nature, society shows greater approval toward the female participant.

4. There is a common agreement among the studies reported that training in art education has a significant and positive influence on increasing the general creative potential of individuals. How creativity increases and how it is used under transfer situations are questions which need investigation in depth.

5. Many of the studies reported a relatively low correlation between measures of mental abilities and measures of creative abilities. In several studies this relationship occurred with samples of students possessing superior mental abilities. Guilford, on the other hand, pointed out that when the entire range of mental abilities were treated, those scores falling within the lower ranges of mental abilities tended to show a substantial positive relationship with creative abilities. Only a few studies, however, showed this result.

6. With the exception of pre-school children and those with mental retardation, school children in general do not differ in their creative abilities when compared on different socio-economic backgrounds. Thus, it can be concluded that different cultural environments do not handicap creativity in children.

The review of the literature reported in this chapter has relevancy to the present study. The relationship is more in line with the broad and general aspect of creative behavior. In reference to the primary purpose of this study, that of assessing non-verbal creative artistic differences between individuals and the groups, the literature did not provide any previous investigations of this nature. Those studies which have treated the individual and group comparisons have mainly dealt with the verbal aspect of creative productivity.

CHAPTER III

DESIGN AND METHODOLOGY OF THE STUDY

The purpose of this study is to determine whether or not the degree of non-verbal artistic aspects of creativity is greater in the products of individuals or in the products of groups. This chapter is devoted to the definition and explanation of the research design: the research site and population, the instruments used to assess non-verbal artistic creativity, the testing procedures, the criteria for evaluating non-verbal artistic creativity, the procedure used to evaluate the non-verbal artistic creative products, the selection of the judges, the training of the judges, the independent variables, and the statistical tests used to analyze the data.

Research Site and Population

The testing for this research was conducted at Roosevelt School, a laboratory school located on the campus of Eastern Michigan University. It is a comprehensive school housing all grades from kindergarten through the senior year of high school. In addition to the function of educating its student body of approximately five hundred, Roosevelt School also serves as a center for student teaching and as a center for experimentation and research. It is also used for observation and participation by students in the field of education prior to student teaching.

The population of this study included all students from grades one through twelve of Roosevelt School. Because of the concern for experimentation and research, students were admitted in order of application without bias for intelligence, race, religion, and social class. However, there has been a tendency in the past for a greater majority of the students to be of a higher-ability and higher socio-economic level. Within the past few years, an attempt has been made by the administration to establish a student population which would represent a cross section of the community.

Non-Verbal Artistic Creativity Instrument

The two forms of the instrument which were used to assess the non-verbal artistic factors of creativity were of similar substance and structure. For convenience of identification, the two forms were labeled Test X and Test Y. Test X consisted of six colored cursive shapes to be applied to a neutral gray 12" x 18" rectangular background sheet. Test Y was made up of six colored angular shapes to be applied to a neutral tan 12" x 18" rectangular background sheet. Because the students were exposed to both tests, either as an individual or in a group, the two categories of shapes for Test X and Test Y were utilized to minimize the effects of conditioning and learning. Prior to administration, the test forms were placed inside an envelope along with a pair (or pairs) of scissors and a package (or packages) of paste.

The instrument was developed over a period of years by the investigator of this study. Certain assumptions were made as guiding criteria for the development of an effective and usable instrument. These assumptions were:

1. The instrument should produce a product that could be evaluated by the four identified criteria.

2. The instrument should be devised of material that would lend itself to flexibility of manipulating.

3. The instrument should be composed of a determined number of given shapes and colors, and these shapes should be conducive to a high degree of redefinition.

4. The instrument should be of a type that could be used by all students of all ages in grades one through twelve.

To determine the appropriate material to use, different materials, such as wood, cardboard, and paper were tested with students of various ages and abilities. The outcome of these tests revealed that colored construction paper had a greater flexibility of manipulation than the other materials tested.

A large variety of abstract shapes were then formed from construction paper in an attempt to select the shapes most conducive to redefinition. Those shapes which were not changed by a majority of students were eliminated. The shapes which were retained and retested were those which showed a high degree of redefinition. These were eventually reduced to six cursive shapes and six angular shapes to be used as part of the test forms.

In order to balance the effect of color in each test form, intense colors were chosen for three of the shapes and subdued colors were selected for the other three shapes in the test form. A neutral shade for the ground sheet was used to avoid conflict with the colors of the shapes. In order to reduce the effects of dominance and preference for one color, each of the twelve shapes and the two ground sheets represented a different color and shade. Actual size representations of the shapes used and indications of their respective color appear in Appendix A.

Testing Procedure

The students in each grade were divided randomly into two groups. For convenience, the groups were labeled Group "A" and Group "B."

The two tests were administered in the following manner:

1. Test X was administered to Group A on a group basis, each subgroup producing a single product.
2. Test X was administered to Group B at the same time, in a separate room on an individual basis, each individual producing a single product.
3. The procedure was then reversed for Test Y for each grade level. Twenty-four hours or more after taking Test X, Test Y was administered to Group A on an individual basis and to Group B on a group basis. The testing model is found in Appendix B.
4. Two rooms were used during the testing period, one for individual testing, the other for group testing. When tested individually, the students were seated facing away from each other at tables arranged in a circular manner around the room. When tested in groups, the students within the subgroups were clustered around single tables arranged at different localities around the room.
5. The subgroups producing a single product were composed of three to five students. In order to form the subgroups, folded papers with numbers were placed in a box and each student selected a number indicating the subgroup in which he was to work. Thus, the members of each subgroup were randomly selected.
6. Each of the test products was identified by a symbolic code number. For example, Test X, given

to Group B of the third grade on an individual basis were given Arabic numbers from one to the total number of student products produced. The Arabic numbers were then continued for Test X given to Group A for each subgroup product. In other words, the consecutive numbers of the test products comprised of all the individually administered tests and all the subgroup administered tests for one grade level. A sample of the symbolic code for a product of the third grade appeared as 3-X-1. The first Arabic number indicated the grade level; the letter X indicated the test; and the last Arabic number indicated the product of the individual or the subgroup. The same symbolic code procedure was followed for each grade level.

7. All the students were read the same instructions. The instructions used for administering the tests to subgroups and individuals are found in Appendix B.

The administrators for the testing were four graduate assistants in the Department of Education. In order to establish uniformity of administration, two orientation sessions were scheduled. Working in pairs, the administrators were trained to organize the groups, to code the tests, to read the instructions, and to administer the tests. Several mock test runs were held until a high degree of uniformity was attained by the administrators working in teams.

During the actual testing, each pair of administrators was assigned separate grade levels. In other words, the same pair of administrators were maintained for all the testing to be accomplished in one grade level. It was felt that this procedure would help to ensure a high degree of uniformity.

Criteria for Evaluating the Products

The criteria were derived from a measure for creative talent defined by Guilford and Lowenfeld.[1] The following four variables were used in evaluating each product for non-verbal artistic creativity, and a nine-point scale of zero to eight was established for each of the criteria:

Criterion 1: Aesthetic Organization - indicates the refinement and delicacy by which a participant or participants react to the problem and materials--the ability to arrange the forms and materials in accordance with the principles of harmonious organization. This variable encompasses such aesthetic principles as harmony, balance, and symmetry, as applied to the organization of a non-verbal artistic creative product.

Criterion 2: Redefinition - means ability to change the provided materials by using them in new ways, by giving them new shapes, new meanings, new purposes, and by rearranging perceived forms into new combinations. This variable can be explained as the ability to create an artistic product by changing given forms and rearranging them in ways that do not follow stereotype patterns of organization.

Criterion 3: Originality of Elaboration - assesses the ability to establish novel arrangements of redefined forms by going beyond the given dimension and the given number of shapes in varied and divergent ways. This variable relates the ability to change dimensions, to vary the dimensions, and to reform the redefined shapes and apply them in a varied and divergent manner.

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[1] Viktor Lowenfeld, "Current Research in Creativity," NEA Journal, XLVII (1958), 538-40.

Criterion 4: Fluency of Ideas - means the number of varieties and variations of approaches a participant may take in dealing with a problem--the use of similar materials in a variety of ways, for different purposes, using diverse techniques or methods. This variable has a quantitative value in terms of the number of ideas that are manifested in the utilization of the forms, shapes, and materials.

Evaluation Procedure

A panel of three judges rated each product by the four criteria on a nine-point scale of zero to eight. The total score for each criterion was the sum of the three scores given by the judges. The composite score was the sum of the totals from the criteria scores.

In order to minimize later bias, the following procedures were used:

1. Each of the judges was scheduled separately to score the products.
2. All the products were assembled in one central location.
3. Group products were not distinguished from individual products.
4. The products from one grade level were not distinguished from products of other grade levels.
5. The products of Test X and Test Y were grouped separately.
6. Each judge viewed all the products before beginning the scoring procedure.
7. Each judge completed the scoring of one criterion for all products before starting on the next criterion.
8. The starting point and the order for scoring the products were changed for each criterion.

9. In order to reduce fatigue, the judges were advised to score the products on two consecutive days.

Selection of the Judges

Since a high degree of knowledge and skill was necessary to evaluate the products competently, the following criteria were applied for the selection of the three judges:

1. That they be persons who are recognized as competent either by the nature of their position or accomplishments.
2. That they be persons who have competency in their valued judgments of non-verbal artistic creative products of students.
3. That they be persons who have had previous understanding of the criteria used in evaluating creative talent as defined by Guilford and Lowenfeld.
4. That they be persons who would be willing to commit themselves to evaluate all the products in this study.
5. That they be persons who would be easily accessible in terms of distance and communication.

The judges who were finally chosen were professors of Art and/or Art Education from three separate universities: The University of Michigan, Eastern Michigan University, and Wayne State University.

Training of the Judges

The judges met as a group with the researcher on several occasions. During these sessions the criteria and scoring procedures were discussed, analyzed, and defined. When common understanding and agreement were established on the application of each criterion, the scoring procedures were applied on a group of sample products from pretest trials. Several test runs were made until the judges felt they had reached a high degree of inter-judge agreement with their scores.

Independent Variables

Mental Abilities

The Lorge-Thorndike Intelligence Test and the Differential Aptitude Tests were used as a measure of the mental ability of the students. The Lorge-Thorndike was used for grades one through seven. Both the verbal and non-verbal sections were used for grades three through seven. An average of the verbal and non-verbal scores was computed for the general mental ability score.

Grades eight through twelve received the Differential Aptitude Tests. The scores for Verbal Reasoning and Language Usage were combined and adjusted to secure an overall measure of verbal aptitude; the scores on Numerical Ability and Abstract Reasoning were combined and adjusted for an overall measure of non-verbal aptitude. General Mental Ability was measured as a composite of Verbal Reasoning and Numerical Ability.

The test scores were obtained, whenever possible, from the students' permanent school records. Those students who had not been tested at the beginning of the school year were given the mental ability tests by a research assistant.

Grade Levels and Grade Groupings

Only the students from grades one through twelve were tested in this study. These students were placed into an administrative structure following a six--three--three--system.

The elementary school housed a single class for each of the six grade levels. Because the design of this research necessitated a testing of two groups at each grade level, the students within each of the classes were divided into approximately two equal groups. The numbers of students at each grade level as shown in Table 1, on page 61 were: twenty in the first grade, twenty-one in the second grade, twenty-seven in the third grade, twenty-eight in the fourth grade, twenty-three in the fifth grade, and twenty-seven in the sixth grade.

The students within the seventh and eighth grades were grouped randomly into two core classes for administrative purposes. Since each grade level contained two classes, the regrouping of students was not necessary. Consequently, these two core classes were used as groups in the cross testing. The two groups totaled fifty-eight students in the seventh grade and sixty-two students in the eighth grade.

The ninth graders and the high school students were randomly placed at each grade level for administrative purposes into two home rooms. Thus, for grades nine, ten, eleven, and twelve, the two home rooms at each grade level became Groups A and B for the cross testing. The ninth grade had an enrollment of sixty-four, the tenth grade had fifty-four, the eleventh grade had fifty-two, and the twelfth grade had sixty-three students.

In order to adjust for number of cases needed within various categorical groups, grades were combined into groups for statistical analysis. The combinations of grade groupings were restricted within the divisions of one to seven and eight to twelve, established by the administration of the two mental ability inventories. For this reason, the following grade combinations were used generally throughout this investigation: (1) two groupings--one through seven and eight through twelve; (2) five groupings--one and two, three and four, five through seven, eight and nine, and ten through twelve.

Male and Female Subjects

The division into male and female categories by grade level and for the total student population is shown in Table 1.

TABLE 1

DISTRIBUTION OF MALE AND FEMALE SUBJECTS
BY GRADE LEVEL

Grades	1	2	3	4	5	6	7	8	9	10	11	12	Total
Male	12	8	16	15	16	15	27	30	35	24	29	28	255
Female	8	13	11	13	7	12	31	32	29	30	23	35	244
Total	20	21	27	28	23	27	58	62	64	54	52	63	499

Occupational Groupings

Occupation of head of household was used as an index for socio-economic status. These data were obtained from the students' permanent records. When the records were incomplete or not clear, the parents were contacted by telephone for additional information on job description.

Occupations were classified into five broad catefories using a modified version of Warner's[1] socio-economic index:

Category one: Professionals, Executives, Proprietors, and related occupations.

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[1] W. Lloyd Warner, Social Class in America: The Evaluation of Status (New York: Harper & Row Publishers, 1960), pp. 132-38.

Category two: Managers, Semiprofessionals, Small Business Owners, Administrators, and related occupations.

Category three: Clericals, Sales Workers, Technicians, One-man Business Owners, and related occupations.

Category four: Skilled Workers.

Category five: Unskilled Workers.

Analysis of the Data

The data collected for this study will be analyzed in the following manner; the Pearson product-moment correlation coefficient will be used to analyze the data concerning the inter-rater reliability of scores given by the three judges on all of the four criteria and the composite scores, the relationship between each of the four criteria scores and the composite score, and the relationship between the composite score and each of the defined mental ability scores.

An analysis of variance for unequal groups will be used to test for significant differences among the creativity mean scores for all the grade levels and the groups of grades combined on the following variables; creativity composite scores for grades one through twelve, and creativity composite scores by occupational groupings for all grades combined.

The t test will be used in analyzing the data to compare the differences between the creativity mean scores of groups and individuals, male and female subjects, art and non-art students, and high and low mental ability groups.

The common practice of accepting the five per cent level or less as statistically significant will be followed in this research when reporting the analysis of the data in the following chapter.

CHAPTER IV

ANALYSIS OF DATA

This study is designed primarily to compare the non-verbal artistic creative products of individuals and groups. It also compares the non-verbal artistic creative products of males and females, of students who have taken art and those who have not taken art, of above average and below average mental ability groups, and of various occupational groupings. Furthermore, the study examines the relationship between non-verbal artistic creativity and selected components of mental abilities.

This chapter is divided into three parts. Part One reports the inter-rater reliabilities of the scores of the three judges on Tests X and Y for all four criteria and the composite score. Also reported are the correlations between each of the criteria and the composite score for each judge on both test forms. Part Two reports on comparisons among grade levels and comparisons of individual and group with respect to non-verbal artistic creativity. Part Three reports on comparisons of individual creativity scores based on sex differences, art instructions, mental abilities, and occupational groupings.

Part One

Inter-rater Reliability of Scores Given by Judges

Three judges rated the non-verbal artistic creative products for each of the four criteria on a nine-point scale from zero to eight. The product-moment correlations between the judges for each criterion and the composite scores for Test X are shown in Table 2.

TABLE 2

CORRELATION COEFFICIENTS BETWEEN THE THREE JUDGES ON TEST X FOR ALL FOUR CRITERIA AND THE COMPOSITE SCORE

Criteria	Judges 1-2	Judges 1-3	Judges 2-3	Mean
Aesthetics	.51	.57	.34	.48
Redefinition	.80	.75	.75	.77
Originality	.75	.73	.77	.75
Fluency	.80	.81	.81	.81
Composite Score	.92	.85	.86	.88
Mean	.79	.75	.74	.77

n=499

The table reveals that, in general, there is a relatively high degree of agreement among the judges in scoring the criteria. When examining the criteria separately, the scores on the quantitative measure of Fluency achieved a higher degree of agreement than did the scores of the qualitative measures of Redefinition, Originality, and Aesthetics. Because of the difficult nature of its assessment, the area of Aesthetics received the lowest correlation coefficients. Most important, however, is the high degree of agreement among the judges when all the criteria were combined. The composite scores have the greatest inter-rater reliability, and they compare favorably with the reliability of standardized tests.

A similar pattern of agreement among judges is seen in Table 3 for Test Y.

TABLE 3

CORRELATION COEFFICIENTS BETWEEN THE THREE JUDGES ON TEST Y FOR ALL FOUR CRITERIA AND THE COMPOSITE SCORE

	Judges			
Criteria	1-2	1-3	2-3	Mean
Aesthetics	.62	.64	.5	.60
Redefinition	.77	.76	.73	.75
Originality	.77	.63	.72	.71
Fluency	.72	.78	.75	.75
Composite Score	.91	.86	.83	.87
Mean	.78	.75	.73	.75

n=499

In both tables Fluency received the highest degree of agreement among the judges. Redefinition, Originality, and Aesthetics follow a descending order in relation to the inter-rater reliability scores. Both tables support the conclusion that the inter-rater reliability of the composite scores is the most stable measure of creativity as defined in this investigation.

Relationship between Each of the Four Criteria Scores and the Composite Score

The correlation between each of the four criteria and the composite score for each judge can be seen in Table 4 for Test X and in Table 5 for Test Y.

TABLE 4

CORRELATION COEFFICIENTS BETWEEN EACH OF THE CRITERIA AND THE COMPOSITE SCORE FOR EACH JUDGE ON TEST X

	Judges		
Criteria	1	2	3
Aesthetics	.78	.31	.75
Redefinition	.87	.88	.90
Originality	.87	.92	.90
Fluency	.90	.88	.84
Mean	.86	.82	.86

n=499

TABLE 5

CORRELATION COEFFICIENTS BETWEEN EACH OF THE CRITERIA AND THE COMPOSITE SCORE FOR EACH JUDGE ON TEST Y

	Judges		
Criteria	1	2	3
Aesthetics	.63	.56	.74
Redefinition	.82	.84	.89
Originality	.76	.89	.87
Fluency	.79	.80	.77
Mean	.76	.80	.83

n=499

The criterion Aesthetics again shows the lowest relationships when correlated with the total score. When the mean is considered, both tables indicate consistently high intra-criteria correlations for each of the judges.

Since the composite scores show a higher degree of agreement among the judges as compared with the individual criterion scores, it was decided to analyze the results in Part Two and Part Three using only the composite scores.

Part Two

Comparisons Among Grade Levels on Creativity

Table 6 shows the results of an analysis of variance of scores for grades one through twelve on Test X.

TABLE 6

ANALYSIS OF VARIANCE OF CREATIVITY COMPOSITE SCORES ON TEST X FOR GRADES ONE THROUGH TWELVE

Source of Variation	df	SS	MS	F	p
Between Groups	11	60992.92	5544.81	28.48	$< .001$
Within Groups	487	94813.09	194.69		
Total	498	155806.02			

For an F distribution with 11 and 487 degrees of freedom, a value of 2.87 is significant at the .001 level. Table 6 shows that the observed F ratio of 28.48 is significant at less than the .001 level.

A similar comparison is made for Test Y for all individual grades. The analysis of variance is presented in Table 7.

TABLE 7

ANALYSIS OF VARIANCE OF CREATIVITY COMPOSITE SCORES ON TEST Y FOR GRADES ONE THROUGH TWELVE

Source of Variation	df	SS	MS	F	p
Between Groups	11	9108.75	828.07	3.58	< .001
Within Groups	487	112634.89	231.28		
Total	498	121743.64			

With 11 and 487 degrees of freedom, the table for F distribution lists a value of 2.87 as significant for the .001 level. Here the observed F ratio is 3.58, obtaining a statistical significance at less than the .001 level.

Consequently, null hypothesis one--that there are no significant differences in ratings of non-verbal artistic creative products among grades one through twelve--is rejected.

In order to give visual meaning to the scores used in the above analysis, the means of the individual scores for each grade on both tests are listed in Table 8 and are charted in Figure 1.

Figure 1 shows growth curves on non-verbal artistic creativity from grade one through twelve. When observing Test X and Test Y, the directions of the curves differ only at the fifth-, eleventh-, and twelfth-grade levels. These differences are shown by increased mean scores on Test Y and decreased mean scores on Test X at the fifth and eleventh grades, whereas a reversal of directions is seen at the twelfth-grade level.

TABLE 8

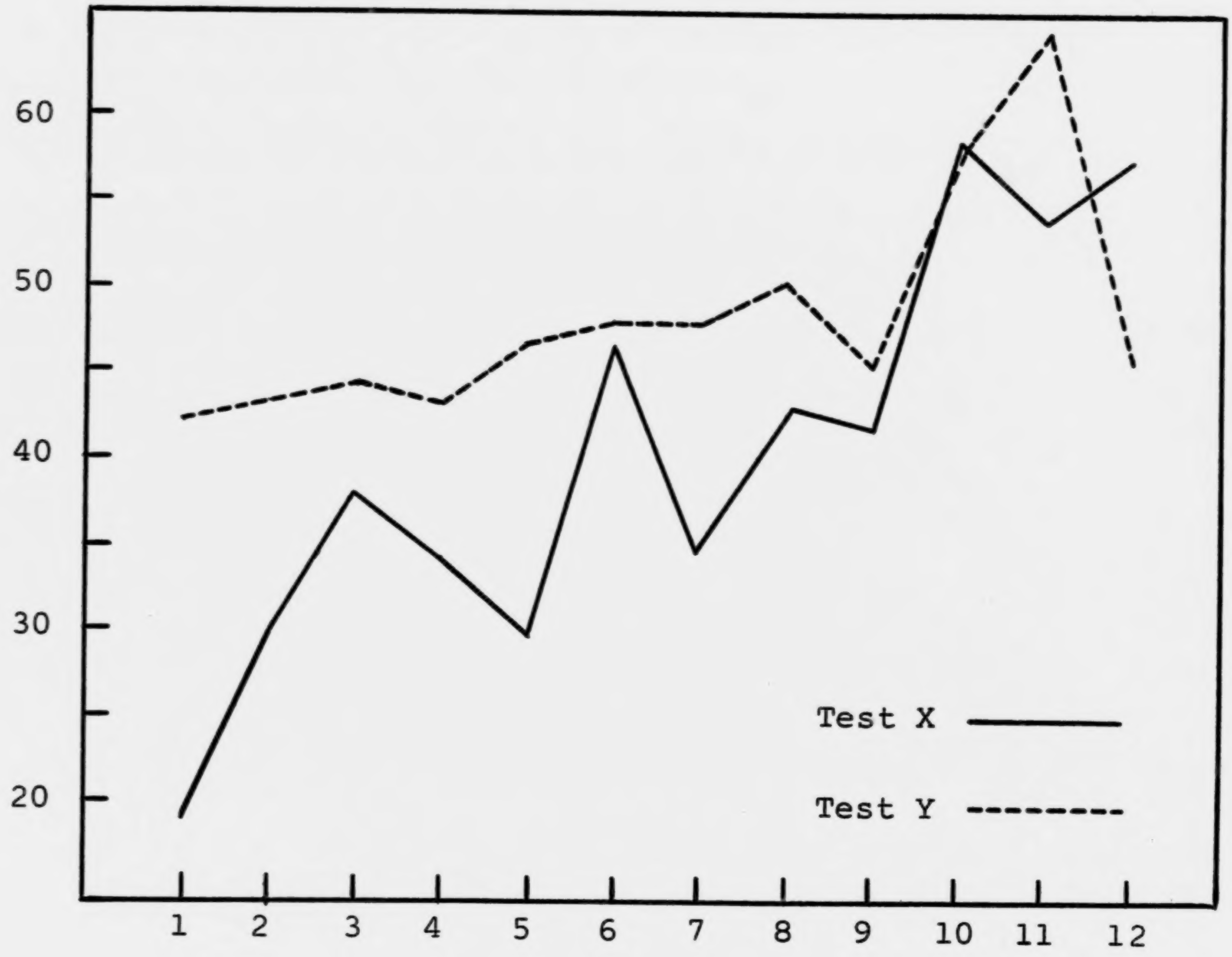
CREATIVITY COMPOSITE MEAN SCORES OF INDIVIDUALS ON TESTS X AND Y FOR GRADES ONE THROUGH TWELVE

	Test X		Test Y	
Grade	n	Mean	n	Mean
1	9	19.00	11	42.09
2	10	29.80	11	42.91
3	13	38.15	14	43.79
4	14	34.29	14	42.79
5	11	29.45	12	46.58
6	13	45.92	14	47.79
7	29	34.59	29	47.72
8	32	41.94	30	50.53
9	32	41.44	32	46.19
10	28	58.57	26	58.08
11	31	53.71	21	64.66
12	33	57.55	30	45.87

An interesting outcome is the variability of the scores on both tests. It is apparent that Test X produced a wider range of scores than Test Y from first through twelfth grade. The lower grades produced a higher degree of non-verbal artistic creativity on Test Y than on Test X. However, this difference is not evident in the upper grades.

FIGURE 1

CREATIVITY CURVES OF COMPOSITE MEAN SCORES OF INDIVIDUALS ON TESTS X AND Y FOR GRADES ONE THROUGH TWELVE



Creativity of Groups versus Individuals

The composite scores of all subjects from grades one through twelve were compared on individual and group productivity. The _t_ ratio for these comparisons on Tests X and Y are presented in Table 9.

The results indicate that on both Tests X and Y the _t_ ratios are statistically significant at less than the .02 level. The mean scores, furthermore, reveal that the significant differences are in favor of the group. Therefore, null hypothesis two--that there are no significant differences in the ratings of non-verbal artistic creativity between individual and group products for all grades combined--is rejected.

TABLE 9

COMPARISON OF CREATIVITY COMPOSITE SCORES
OF GROUPS AND INDIVIDUALS
ON TESTS X AND Y FOR ALL GRADES COMBINED

Test	Group			Individual				
	n	Mean	S.D.	n	Mean	S.D.	t	p
X	244	50.32	17.52	255	44.08	17.34	4.00	< .001
Y	255	52.58	15.40	244	49.18	15.73	2.43	< .02

In order to find if there were any differences between individual and group performances among the various levels of the school grade structure, groups of grades were combined for statistical analysis. Table 10 presents the results of these comparisons.

When examining each of the grade groupings separately, grades one and two show that the t-ratio of 3.32 for Test X is statistically significant at less than the .01 level in favor of group creativity. Although the mean scores for Test Y indicate a higher rating in favor of group creativity, the t-ratio of .51 for this test is not statistically significant.

On both Tests X and Y, the t-ratio for grades three and four, and five through seven are not statistically significant. Thus, the intermediate grades do not demonstrate any significant differences between group and individual creativity scores.

TABLE 10

COMPARISON OF CREATIVITY COMPOSITE SCORES OF GROUPS AND INDIVIDUALS ON TESTS X AND Y FOR GROUPS OF GRADES COMBINED

		Group			Individual				
Grades	Test	n	Mean	S.D.	n	Mean	S.D.	t	p
1-2	X	22	37.09	12.46	19	24.68	11.31	3.32	< .01
	Y	19	44.21	8.80	22	42.50	12.01	.51	NS
3-4	X	28	31.18	11.54	27	36.15	11.34	1.61	NS
	Y	27	48.37	12.11	28	43.29	15.20	1.37	NS
5-7	X	55	41.73	13.58	53	36.30	15.24	1.95	NS
	Y	53	51.49	17.85	55	47.49	11.39	1.39	NS
8-9	X	62	52.65	10.74	64	41.69	16.71	4.36	< .001
	Y	64	53.80	18.27	62	48.29	17.07	1.75	NS
10-12	X	77	65.34	13.99	92	56.57	12.52	4.30	< .001
	Y	92	55.32	12.73	77	55.17	16.67	.06	NS

A similar trend exists for grades eight and nine and ten through twelve as was seen for grades one and two. The t ratio is statistically significant at less than the .001 level for Test X and not significant for Test Y. Here again the higher rating of the two mean scores favors group creativity.

Therefore, for all five groups of grades on Test Y and for grades three and four and five through seven on Test X, null hypothesis three--that there are no significant differences in the ratings of non-verbal artistic creativity between individual and group products by groups of grades--is not rejected. On the other hand, null hypothesis three is rejected for grades one and two, eight and nine, and ten through twelve on Test X.

The results of the comparisons of group and individual non-verbal artistic creativity are illustrated in Figure 2. Although seven of the ten groupings did not obtain a statistically significant level when group and individual product scores were compared, Figure 2 shows that in nine of the ten comparisons group products did have a higher score than individual products. This observation suggests that the significant _F_ ratios observed (Table 9) when all grades were combined are the result of a cumulative effect of a consistent trend. The only reversal is seen for grades three and four on Test X.

Part Three

Creativity of Male and Female Subjects

An attempt was made to assess the differences between male and female non-verbal artistic creativity. The _t_ ratios of male and female comparisons of Tests X and Y for all grades combined appear in Table 11.

Statistically significant differences at less than the .05 level are shown by the _t_ ratios on both test forms. From the mean score it can be inferred that females demonstrate more creativity on the non-verbal artistic dimension than males.

As a result of the statistical analyses on male and female creativity composite scores on Tests X and Y, null hypothesis four--that there are no significant differences in ratings of non-verbal artistic creativity between male and female subjects for all grades combined--is rejected.

FIGURE 2

CREATIVITY BAR GRAPH OF COMPOSITE MEAN SCORES OF GROUPS AND INDIVIDUALS ON TESTS X AND Y FOR GROUPS OF GRADES COMBINED

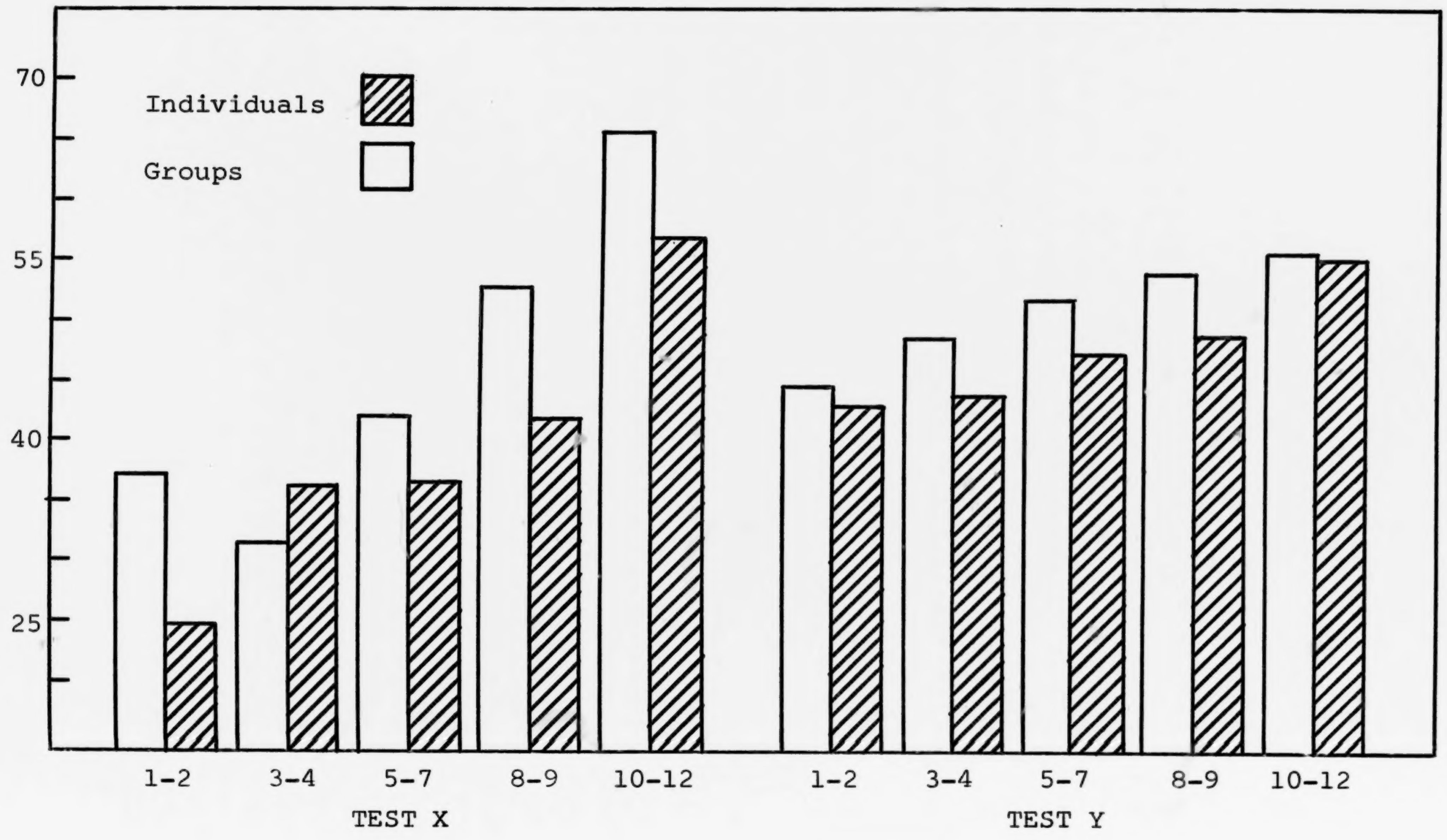


TABLE 11

COMPARISON OF CREATIVITY COMPOSITE SCORES OF MALE AND FEMALE ON TESTS X AND Y FOR ALL GRADES COMBINED

Test	Male			Female				
	n	Mean	S.D.	n	Mean	S.D.	t	p
X	119	41.46	15.71	135	46.37	18.47	2.27	.05
Y	137	45.02	15.13	107	54.51	14.91	4.89	.001

A different set of results appear, however, when the subjects were divided into five groups of grades. The results of the male and female comparisons for five groups of grades are given in Table 12.

The two groups of lower grades show no statistically significant difference between male and female performance scores on the non-verbal artistic creativity tasks. A change appears, however, on this comparison when the results are viewed for grades five through seven. Here Test Y produces a t ratio significant at less than the .05 level, whereas the t ratio for Test X does not achieve a significant difference. Therefore, the statistical outcome of Test Y indicates a higher non-verbal artistic creativity performance by females over that of males than would be expected by chance.

Grades eight and nine show a greater statistical consistency. On both tests, the females achieved a significantly higher creativity score than males. On the other hand, grades ten through twelve did not manifest any significant differences between male and female performance on the non-verbal artistic creative tasks as measured by either test form.

TABLE 12

COMPARISON OF CREATIVITY COMPOSITE SCORES OF MALE AND FEMALE ON TESTS X AND Y FOR GROUPS OF GRADES COMBINED

Grades	Test	Male			Female				
		n	Mean	S.D.	n	Mean	S.D.	t	p
1-2	X	8	24.13	11.85	11	25.09	11.47	.18	NS
	Y	12	41.58	10.11	10	43.60	14.47	.38	NS
3-4	X	13	38.38	8.69	14	34.07	13.33	.99	NS
	Y	19	40.47	16.27	9	49.22	11.21	1.45	NS
5-7	X	26	35.00	13.32	27	37.56	17.05	.61	NS
	Y	32	44.72	9.65	23	51.35	12.67	2.20	$< .05$
8-9	X	33	37.12	13.70	31	46.55	18.41	2.33	$< .05$
	Y	33	40.15	14.39	29	57.55	15.21	4.63	$< .001$
10-12	X	39	54.03	12.96	53	58.43	11.96	1.69	NS
	Y	41	52.29	17.49	36	58.44	15.26	1.63	NS

When considering the statistical comparisons in Table 12, null hypothesis five--that there are no significant differences in ratings of non-verbal artistic creativity between male and female subjects for groups of grades combined--is not rejected on Tests X and Y for grades one and two, three and four, ten through twelve, and on Test X for grades five through seven. However, on Test Y for grades five through seven and on Tests X and Y for grades eight and nine, null hypothesis five is rejected since the t ratio on all three comparisons is statistically significant at less than the .05 level.

The graph as seen in Figure 3 illustrates the statistical results presented in Table 12. The male and female comparisons show that in nine out of ten comparisons female subjects achieved higher mean scores than male subjects even though only three of the ten comparisons attained statistically significant levels. Here again, this occurrence conveys that the significant F ratio observed for all grades combined is the result of a cumulative effect of a consistent trend. The reversal of male and female in the third and fourth grade grouping on Test X is similar to the reversal observed when individual and group product scores were compared on the same test for the grade grouping.

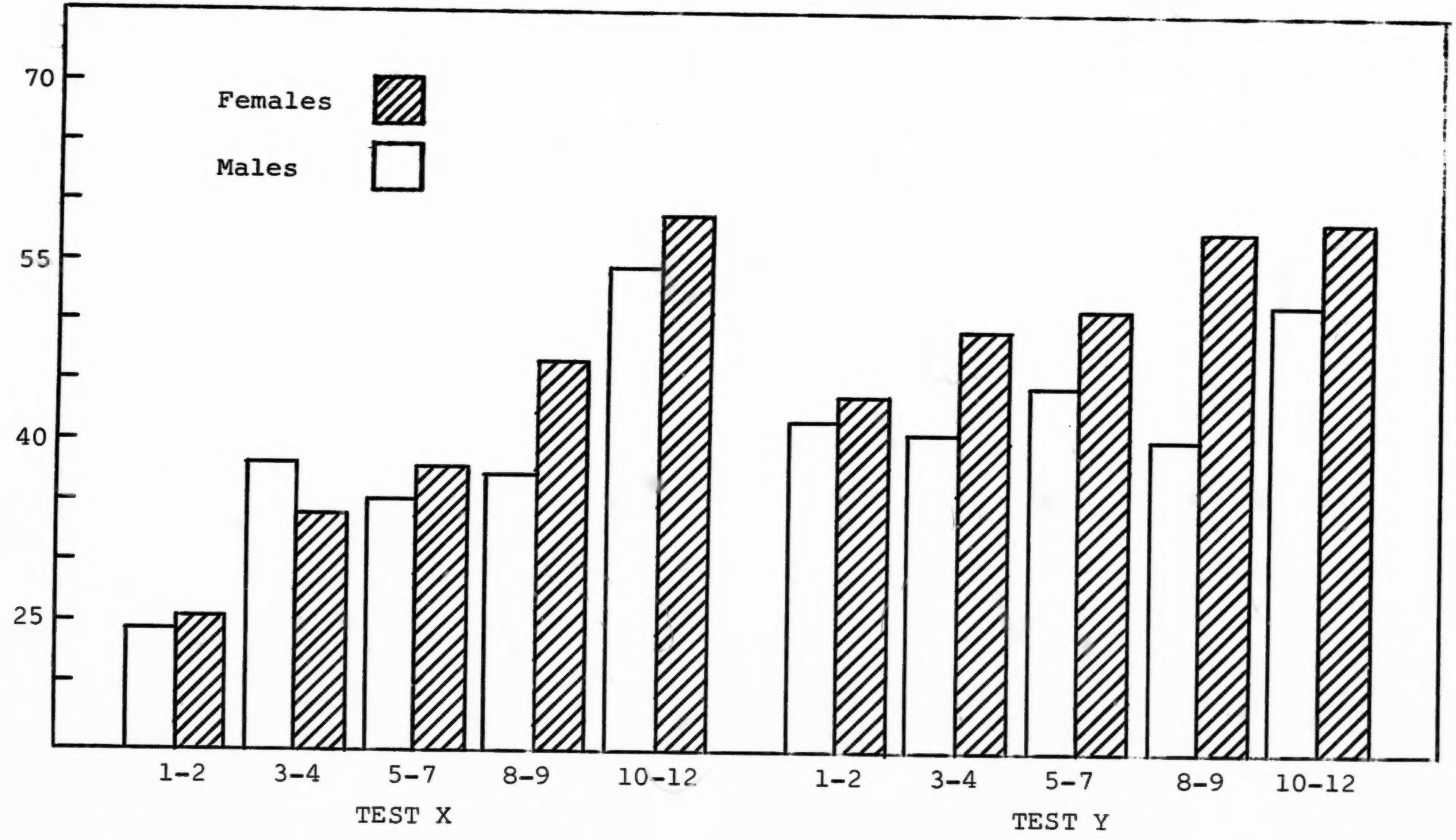
Creativity of Art and Non-Art Students

A comparison was made of art students and non-art students in order to examine whether or not there would be any differences in the performances on a non-verbal artistic task between those subjects who elected to take art and those who did not elect to take art. The sample matched on this variable consisted of subjects from ninth through twelfth grade. The subjects in grades one through seven were eliminated because these students were required to take art as part of their course of study.

The art students were separated according to the number of years they had taken art. As a consequence, two groups were formed. The forty-three students who had taken art for one year constituted one group. Because of the small number of cases, the nineteen students who had taken art for two years were combined with the forty-three who had taken art for one year to form the second group totaling sixty-two. These two groups were then compared separately with the one hundred and seventy-one non-art students divided according to Tests X and Y.

FIGURE 3

CREATIVITY BAR GRAPH OF COMPOSITE MEAN SCORES OF MALES AND FEMALES
ON TESTS X AND Y FOR GROUPS OF GRADES COMBINED



The data for the comparison between the one-year art students and the non-art students are seen in Table 13. The *t* ratio for Tests X and Y on this comparison did not reach a .05 level of statistical significance.

TABLE 13

COMPARISON OF CREATIVITY COMPOSITE SCORES
OF NON-ART AND ONE YEAR ART STUDENTS
ON TESTS X AND Y FOR GRADES 9-12 COMBINED

Test	Non-Art			1 Year				
	n	Mean	S.D.	n	Mean	S.D.	*t*	p
X	91	51.58	15.27	19	53.84	18.57	.56	NS
Y	80	52.57	17.70	24	56.88	17.22	1.05	NS

Similar results are observed in Table 14 when combined one-year and two-year art students are compared with non-art students.

TABLE 14

COMPARISON OF CREATIVITY COMPOSITE SCORES
OF NON-ART AND COMBINED ONE AND TWO YEAR ART STUDENTS
ON TESTS X AND Y FOR GRADES 9-12 COMBINED

Test	Non-Art			1 & 2 Year				
	n	Mean	S.D.	n	Mean	S.D.	*t*	p
X	91	51.58	15.27	31	55.00	16.36	1.06	NS
Y	80	52.57	17.70	31	53.48	18.84	.24	NS

Here again both t-ratios are not significant at the .05 level. Consequently, null hypothesis six--that there are no significant differences in the ratings of non-verbal artistic creativity between the products of non-art students and art students for grades nine through twelve--is not rejected. In general, however, art students seem to do better as indicated by their mean scores than non-art students on both tasks, although not at statistically significant levels.

Creativity of High and Low Mental Ability Groups

In order to compare the performances on the non-verbal artistic creativity tasks between high and low mental ability groups, the following procedures were used to determine the high and low groups on that dimension. For the Lorge-Thorndike Intelligence Test, those subjects whose scores fell on or above 101 were categorized as the high group, and those subjects who received a score of 100 or below were classified as the low group. On the Differential Aptitude Tests the scores of the subjects were divided in accordance with the fiftieth percentile designated by sex and grade on the national norms.

The creativity performance as defined in this investigation was compared for high and low groups on three dimensions of mental ability: verbal mental ability, non-verbal mental ability, and general mental ability. The findings of the high and low verbal ability groups are presented in Table 15.

The t-ratio for groups of grades whose composite creativity mean scores were compared were not statistically significant at the .05 level. For this reason, hypothesis seven--that there are no significant differences in ratings of non-verbal artistic creativity between the products of above average and below average verbal mental ability groups --is not rejected.

TABLE 15

COMPARISON OF CREATIVITY COMPOSITE SCORES OF HIGH AND LOW VERBAL MENTAL ABILITY GROUPS ON TESTS X AND Y FOR GROUPS OF GRADES COMBINED[a]

		High VA			Low VA				
Grades	Test	n	Mean	S.D.	n	Mean	S.D.	*t*	p
1-2	X								
	Y								
3-4	X	17	37.41	9.82	10	34.00	13.86	.75	NS
	Y	18	45.28	14.56	8	40.88	17.80	.67	NS
5-7	X	36	34.64	15.39	17	39.82	14.75	.31	NS
	Y	38	48.61	11.46	14	44.71	12.08	1.07	NS
8-9	X	29	39.45	18.51	35	43.54	15.09	.98	NS
	Y	34	47.68	16.48	28	49.04	18.03	.31	NS
10-12	X	43	57.58	13.71	45	55.13	11.58	.91	NS
	Y	26	57.35	13.51	45	55.53	18.04	.44	NS

[a] *Lorge-Thorndike Intelligence Test* provides only a non-verbal assessment for grades 1-2.

Similarly, Table 16 shows the results when the high and low non-verbal ability groups were compared on creativity mean scores. Different findings are disclosed in Table 16 than appeared in Table 15. Here the third- and fourth-grade group achieved a *t* ratio statistically significant at less than the .05 level on both test forms, whereas the other four groups of grades show no significant differences. This differentiation again demonstrates the uniqueness of the third and fourth grade group as manifested when other variables were compared in this investigation.

TABLE 16

COMPARISON OF CREATIVITY COMPOSITE SOCRES
OF HIGH AND LOW NON-VERBAL MENTAL ABILITY GROUPS
ON TESTS X AND Y FOR GROUPS OF GRADES COMBINED

Grades	Test	High NVA			Low NVA				
		n	Mean	S.D.	n	Mean	S.D.	t	p
1-2	X	7	30.14	14.17	12	21.50	8.35	1.69	NS
	Y	16	43.44	12.12	6	40.00	12.47	.59	NS
3-4	X	16	39.69	10.08	11	31.00	11.52	2.08	< .05
	Y	20	47.20	14.38	6	33.00	14.64	2.11	< .05
5-7	X	40	34.35	15.44	13	42.31	13.43	1.65	NS
	Y	45	46.87	11.99	7	52.00	8.43	1.09	NS
8-9	X	40	40.75	15.62	24	43.25	18.63	.58	NS
	Y	46	48.35	16.73	16	48.13	18.58	.04	NS
10-12	X	52	55.87	14.69	36	57.50	9.10	.41	NS
	Y	39	58.21	16.24	32	53.75	16.62	1.14	NS

Consequently, null hypothesis eight--that there are no significant differences in ratings of non-verbal artistic creativity between the products of above average and below average non-verbal mental ability groups--is not rejected for groups of grades one and two, five through seven, eight and nine, and ten through twelve for Tests X and Y. It is rejected, however, for the groups of grades three and four on both test forms.

The third comparison was made by grouping the highs and lows on the general mental ability scores. The results of the t tests on the creativity scores for these groups are shown in Table 17.

Similar to the findings in Table 15, Table 17 shows that the t ratios for all the groups of grades on Tests X and Y did not reach statistical significance. In accordance, hypothesis nine--that there are no significant differences on ratings of non-verbal artistic creativity between the products of above average and below average general mental ability groups--is not rejected.

Thus, with the exception of the third and fourth grade group on the high and low non-verbal mental ability groupings, the findings show that there are no significant differences in the performances of the non-verbal artistic creativity tasks when the subjects are divided into high and low groups on the three dimensions of mental ability.

Relationship between Creativity and Mental Abilities

In addition to the above statistical procedure, where high and low mental ability groups were compared on creativity scores, the product-moment coefficient of correlation was used to assess the degree of relationship between non-verbal artistic creativity and various components of mental ability. Table 18 gives the correlation coefficients of these relationships according to the various mental abilities listed.

For both groups of grades one through seven and eight through twelve on Tests X and Y, the correlation coefficients ranged from -.02 to .27 with 21 of the 25 correlation coefficients falling below .20. In light of

TABLE 17

COMPARISON OF CREATIVITY COMPOSITE SCORES
OF HIGH AND LOW GENERAL MENTAL ABILITY GROUPS
ON TESTS X AND Y FOR GROUPS OF GRADES COMBINED[a]

		High GMA			Low GMA				
Grades	Test	n	Mean	S.D.	n	Mean	S.D.	t	p
1-2									
3-4	X	15	38.73	9.66	12	32.92	12.83	1.34	NS
	Y	17	45.24	15.01	9	41.44	16.73	.59	NS
5-7	X	37	34.86	15.50	16	39.63	14.56	1.04	NS
	Y	43	47.26	12.41	9	49.00	7.21	.41	NS
8-9	X	36	42.22	15.37	28	41.00	18.56	.29	NS
	Y	18	52.44	16.40	44	46.59	17.23	1.23	NS
10-12	X	58	56.76	13.61	30	55.50	10.73	.44	NS
	Y	32	56.78	17.31	39	55.72	15.92	.27	NS

[a] Lorge-Thorndike Intelligence Test provides only a non-verbal assessment for grades 1-2.

the above evidence, it can be said that there is very little relationship between performances on non-verbal artistic creativity tasks and performances on the given mental ability tests.

TABLE 18

CORRELATION COEFFICIENTS BETWEEN
CREATIVITY COMPOSITE SCORES AND MENTAL ABILITIES

Mental Abilities	Grades 1-7[a] Test Groups X	Y	Grades 8-12[b] Test Groups X	Y
Verbal Reasoning			.25	.14
Language Usage			.26	.14
Verbal Ability	.01	.02	.27	.15
Numerical Ability			.19	.02
Abstract Reasoning			.10	.08
Non-Verbal Ability	.11	.18	.18	.05
General Mental Ability	-.02	.11	.24	.09

[a] _Lorge-Thorndike Intelligence Test_. Correlation coefficients for Verbal Ability and General Mental Ability apply only to grades three through seven. For grades 1-7, n=204; for grades 3-7, n=162.

[b] _Differential Aptitude Tests_. For grades 8-12, n=295.

Creativity and Occupational Groupings

For purposes of comparison, all subjects were distributed into groupings representing five occupational classifications according to the head of the household--professional, managerial, clerical, skilled, and unskilled. For all grades combined, the statistical analysis of creativity scores on Test X by these occupational groupings is given in Table 19.

TABLE 19

ANALYSIS OF VARIANCE OF CREATIVITY COMPOSITE SCORES BY OCCUPATIONAL GROUPINGS ON TEST X FOR ALL GRADES COMBINED

Source of Variation	df	SS	MS	*F*	p
Between Groups	4	2318.08	579.52	1.88	NS
Within Groups	491	151499.59	308.55		
Total	495	153817.67			

With 4 and 491 degrees of freedom, a value of 2.39 is needed to be statistically significant at the .05 level, indicating that the observed *F* ratio of 1.88 is not significant.

A similar outcome is seen in Table 20 when the scores on Test Y were used for the occupational comparisons.

TABLE 20

ANALYSIS OF VARIANCE OF CREATIVITY COMPOSITE SCORES BY OCCUPATIONAL GROUPINGS ON TEST Y FOR ALL GRADES COMBINED

Source of Variation	df	SS	MS	*F*	p
Between Groups	4	536.00	134.00	.55	NS
Within Groups	491	120436.91	245.29		
Total	495	120972.91			

Here again the F ratio of .55 is not statistically significant at the .05 level. Accordingly, null hypothesis ten--that there are no significant differences in ratings of non-verbal artistic creative products of individuals among occupational groupings for all grades combined--is not rejected.

The mean scores on non-verbal artistic creativity are listed in Table 21 and graphed in Figure 4.

TABLE 21

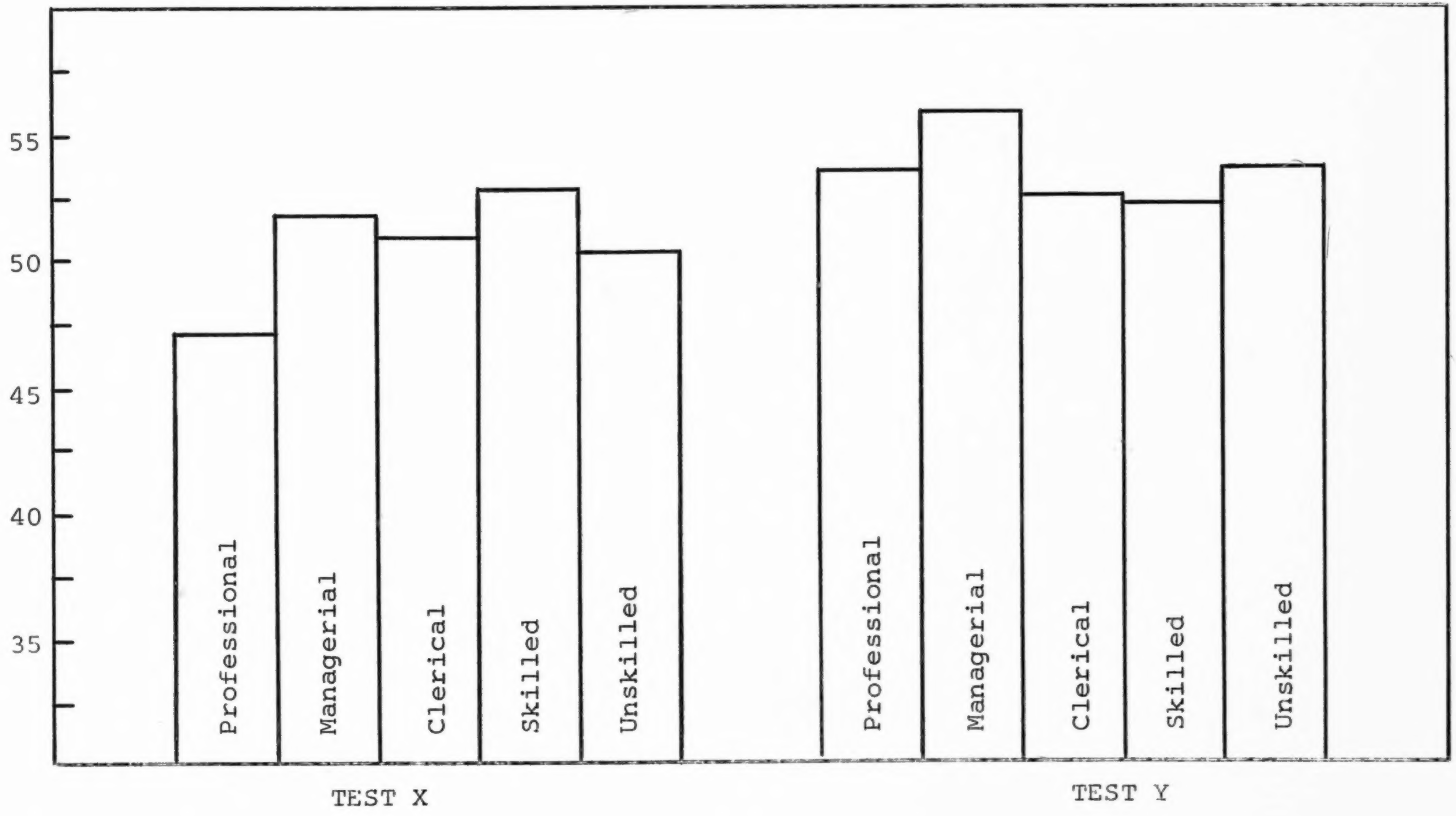
CREATIVITY COMPOSITE MEAN SCORES OF OCCUPATIONAL GROUPINGS ON TESTS X AND Y FOR ALL GRADES COMBINED

	Test X		Test Y	
Occupation	n	Mean	n	Mean
Professional	109	44.67	92	51.07
Managerial	31	49.14	40	53.27
Clerical	56	48.34	61	50.06
Skilled	35	50.31	26	49.95
Unskilled	22	47.80	24	51.09

The table and graph show that when both tests are considered, the subjects within the managerial level in general did slightly better by ranking than the other four levels, although a low consistency is seen in the ranking between the two test forms.

FIGURE 4

CREATIVITY BAR GRAPH OF COMPOSITE MEAN SCORES OF OCCUPATIONAL GROUPINGS ON TESTS X AND Y FOR ALL GRADES COMBINED



CHAPTER V

SUMMARY, DISCUSSION, AND CONCLUSIONS

There are several common principles of creative behavior recognizable within the numerous and diversified theoretical frameworks of creativity which have appeared in the literature of recent decades. The common principles which have been supported by many experimental studies in this area can be summarized as follows: (1) some aspects of creativity are generally found in all individuals in varying degrees; (2) creativity is a behavior which can be fostered under special climates that give recognition to interest, motivation, experience, and freedom of exploration; and (3) creativity is not unique to a few human endeavors, but can be part of all human efforts.

The present study, while recognizing these common principles, has been designed primarily to compare the differences in non-verbal artistic creativity between individuals and groups. In addition, comparisons have been made relating differences in individual creativity to sex, art education, mental abilities, and occupational groupings.

The population selected was the total student body enrolled in the first through twelfth grades of the laboratory school at Eastern Michigan University. A non-verbal artistic creativity instrument, devised by the investigator, was administered to all students in each grade under two testing conditions--as individuals and in small groups.

Prior to this study, the instrument was exposed to pre-testing in order to develop an instrument which would be adaptable to a high degree of flexible creative manipulation. Evolving from this procedure was a final product composed of two test forms. The purpose of utilizing the two test forms was to reduce learning effects when individuals were exposed to each form under alternate testing conditions.

Reliability of Criteria

As a means of evaluating the creative products, four criteria were selected from several that were developed by reliable researchers. These were: Aesthetic Organization, Redefinition, Originality of Elaboration, and Fluency of Ideas.

The creative products of the individuals and groups were scored for each criterion on a nine point scale by three judges selected for their competency in this area. The score arrived at for each criterion was the sum of the scores given by the three judges independently. A composite score was also computed by adding the totals of the four criteria scores.

To determine the inter-rater reliability of the scores designated by the judges, the ratings were analyzed by the Pearson product-moment correlation coefficient. The results showed that three of the criteria, Redefinition, Originality, and Fluency on both test forms constituted perceptive measures capable of attaining a high degree of agreement among the judges. The criterion Aesthetic Organization, on the other hand, was perceived and judged with only a moderate degree of agreement (Table 2, page 64 and Table 3, page 65).

The following speculations are provided for the occurrence of the moderate interjudge agreement concerning the perceptibility and measurability of Aesthetic Organization in relation to the other criteria. Although the judges, at the termination of the training session, collectively agreed that common understanding existed in assessing the products in terms of the relationship between the points of departure (the given components of the instrument) and the degrees of departure (the utilization of the components) as defined and interpreted for each of the criteria, it seems, nevertheless, that the relationship between the points of departure and the degrees of departure may not have been commonly understood for the criterion Aesthetic Organization when applied to the products of the present Research.

Perhaps what may render Aesthetic Organization perplexing to assess is the difficulty in identifying the points of departure since, in this instance, the points of departure are not the components of the instrument but the organization of the components. Should these points of departure be ascertained a new difficulty then arises, generated by the infinite variety of directions in which the degrees of departure may be displayed. The interpretations of these infinite qualities, in turn, may mask the thread of common judgmental reliability.

In other words, such elements as harmony, unity, and balance of Aesthetic Organization are qualities which, because of the nature of the problem, become colored by internalized subjective interpretations. Thus, it may be adduced that the occurrence of the moderate agreement among the judges on this criterion may be attributed more to an intuitive-related interpretation than to an object-related interpretation.

Fluency of Ideas which received the highest interrater reliability among the criteria is expressed by the number of ways the participants use the components given in the instrument. As countable features these variations in the treatment of forms, shapes, and dimensions were readily differentiated and tallied with similar magnitude by all the judges independently.

The degree to which Redefinition was distinguished was commensurate with the degree to which the given components of the tests had undergone change. The transformations of these given components into new shapes, new forms, and new combinations were perceived with equivalent evaluations by the judges separately because the degrees of departure were easily recognizable.

Originality of Elaboration is an extension of Redefinition. Both are qualitative measures. The substance of the criterion, Originality, is manifested by the ability of the participants to extend the redefined elements into new dimensions and elaborations in varied and divergent ways. Here again, the qualities with which the novel elaborations were treated became evident and compatible to the judges because the degrees of departure from stereotyped patterns were commonly differentiated under independent action of the evaluators.

Eisner in his study of children's creativity in art, also found a moderate interjudge agreement on the type-criterion of Aesthetic Organization in the locus of Form-Structure (page 21). The product-moment correlation among Eisner's three judges were .58, .56, and .68 with a mean of .61. The present study showed similar results. The correlations were .51, .57, and .34 with a mean of .48 for Test X (Table 2, page 64) and .62, .64 and .52 with a mean of .60 for Test Y (Table 3, page 65).

When each of the criteria was correlated with the composite scores for each judge, Aesthetic Organization again showed lower correlations than the other three criteria. However, the mean correlations of the four criteria for each of the judges were high ranging from .82 to .86 for Test X (Table 4, page 66) and .76 to .83 for Test Y (Table 5, page 66). Accounting for these results and the magnitude of the inter-rater reliability of the composite scores (Table 2, page 64 and Table 3, page 65), the consideration of using the scores of each of the criteria to analyze the data was dropped. All the evidence supported the use of the composite score as the most stable measure of non-verbal artistic creativity.

Differences among Grades

Once the decision was made to use the composite scores throughout the study, the next analysis treated was a comparison of all grade levels on creativity. By apply-an analysis of variance to the data, the results showed statistically significant differences among grades on both test forms (Table 6, page 67, and Table 7, page 68).

In order to better interpret these results, the mean scores for each grade were illustrated in graph form (Figure 1, page 70). When considering the total creativity curves, there is evidence that older students are more creative than younger students on the task defined in this study. The greatest manifestation of creativity is evident at the tenth grade and beyond. Moreover, the curve is not uniform but jagged in its upward sweep, affected by the fluctuations from grade to grade.

Since the fluctuations of the creativity curves for both tests did not always correspond at every grade level, a problem arose in drawing interpretations. Observations of these fluctuations showed that at grades five, eleven, and twelve the connections between the points of each of these grades from their previous grades tended to go in opposite directions. In addition, when dips occur at grades four, seven, and nine, the degree of the dips on one of the tests tended to be relatively slight. Since these occurrences can only be considered to be chance variations, the interpretations of the data will be speculations based on a smoothed corrected curve derived from a generalized curve of Tests X and Y combined (Appendix C, page 130).

Because the chance occurrences of the increasing and decreasing dimensions of creativity depicted in the generalized curve have been reduced by the smoothed curve, the growth aspects of creativity can now be better observed and speculatively interpreted. As shown on the smoothed curve, the greatest growth of creativity occurred during the periods between first and third, fifth and sixth, and eighth and tenth grades.

The concentrated areas of interest for speculative purposes, however, lie at the stages of creative development between third and fifth, sixth and eighth, and tenth and twelfth grades. The observed portions of the curve during the first two stages revealed a plateauing aspect of creativity. The latter portion of the curve along with a plateauing effect revealed the highest points of creative behavior within the total continuum. The focal point of interest within this portion was the decreasing aspect of creativity after reaching its peak during the eleventh grade.

The question then arises: what speculative assumptions can be formulated which may give some assistance in explaining these phenomena and which, in turn, may be explored by future research. The periods of creative behavior depicted by the plateaus seem to correspond to crucial transitional stages in the physical, psychological, or social development of young individuals. During these transitional developments, new anxieties, new relationships, and new demands may be perceived and imposed on their sphere of behavior.

At about the period spanning the fourth and fifth grades when the young individuals are anywhere from nine to eleven years of age, different psychological and social changes occur, brought on by the onset of preadolescent development. During this interval in their growth, young people seem to seek greater peer identification, acceptance, and approval, and in so doing conform more readily to the limitations circumscribed by peer norms. The needs and modes for conformity at this transitional stage, however, are shared only by individuals of the same sex and may be found to be some of the underlying pressures that curb their creative behavior.

After a period of adjustment and creative growth, new anxieties and conformities, produced by new physical, psychological, and social changes, seem to appear during entrance into adolescence for young people at about their seventh and eighth year of school. Here the individuals begin to undergo bodily changes of puberty. These alterations of bodily systems may cause some unbalance in psychomotor performance which may increase mental anxieties and affect creative performance. Moreover, their search for peer acceptance and approval is now directed toward the opposite sex which also may add new demands for conformity and adjustment.

Once these young people have adjusted to the world of adolescence, they seem then to undergo the greatest growth in creative performance. The rapid rise continues to about the tenth grade leveling off and reaching its peak at about eleventh grade and then declining slightly at about the twelfth grade. The slight drop in creative performance during the last year of high school may be speculated as having some relationship with the anticipation and introduction to the conforming expectations of the adult world. During this period, they may perceive their sphere of behavior as being gradually reduced by the limitations placed on them by the increasing social and economic demands of anticipated adulthood. In other words, they may begin to sense that the latitude of acceptable behavior during their middle years of adolescence may no longer have the same latitude of acceptance in the adult domain.

These changes in creative behavior may not only be influenced by the various transitions of growth and development, but also by the transitional discontinuities existing within the organization and operation of school environments. One form of discontinuity may be evidenced by the changes occurring in the way students are organized for instructional purposes at various grade levels. The transition from early elementary education with its emphasis on skill building to later elementary education with its application of skills to build up knowledge may be one such example. Another may be the change from the self-contained classroom to the subject-matter grouping occurring at the seventh- and eighth-grade levels. The environmental changes which occur when students leave the elementary school climate to enter that of junior high school may be another form of discontinuity. In other words, these transitional discontinuities may engender for the students new patterns within which they must conform. A preoccupation with adjustment and conformity may, for a period of time, impede the creative progress of individuals.

Torrance, in his generalized curve of creative abilities, showed a decrease in creative behavior at the fourth-, seventh-, and twelfth-grade levels.

Differences between Group and Individual Creativity

The data were organized in two ways when comparing the differences between group and individual creative performance. First, the data for the entire population from grades one through twelve were analyzed by the use of the t test. Consequently, the comparisons of the mean scores of groups and individuals for Tests X and Y resulted in t ratios that were statistically significant in favor of group performance (Table 9, page 71).

Secondly, the data were treated by groups of grades and again analyzed by the use of the t test. The attempt here was to examine a breakdown of the first comparison. The results of these comparisons, however, revealed different findings for Test X and Test Y (Table 10, page 72). There were no statistically significant t ratios for Test Y on any of the five grade groupings. Test X, on the other hand, showed three of the five t ratios to be statistically significant in favor of group creativity. These significant levels were seen for grade groupings one and two, eight and nine, and ten through twelve.

Since the statistically significant findings on Test X were not supported by the findings on Test Y, these statistically significant results can only be tenuously interpreted. Nevertheless, there may be some speculative theoretical indication of their occurrence which may provide a tentative assumption for testing in future research.

As observed, the sampling of students who, on this comparison, did not achieve significant levels of group creativity mainly fell between the grades three to seven. At this stage of development, students have, by nature, a strong peer identification with their own sex, and to a large degree, a rejection of involvement with the opposite sex. In younger children, these characteristics are not as strongly set, and as long as the involvement is non-sex differentiated, they are more accepting of interaction with the opposite sex. Older students, on the other hand, who are in the adolescent stage of development purposely seek and accept this interaction as part of their normative peer relationship. The participants of the subgroups tested for group creativity in this study included both males and females randomly selected. Thus, considering these aspects, the question arises: could the nature of the strong peer identification of students in the age range falling within grade three to seven hamper interaction and, as a result, reduce the creativity of the group when these students were placed in heterogeneous groups on the variable of sex? This interpretation of the results in the present study, of course, is speculative and further investigations are needed to investigate the inference.

Another point of speculation can be made concerning the two test forms. Since the findings of Tests X and Y were not consistent, perhaps a closer examination of the data may reveal some aspects of differences that could be attributed to the test forms.

An observation of Table 9 showed that some substantial differences existed between the mean scores of groups and individuals when related to the two test forms. Test X showed a 6.24 difference between means, whereas Test Y only showed a 3.40 difference. A similar differentiation was revealed in Table 10. The differences between the means on each of the five comparisons on Test X were greater than those of the five comparisons on Test Y. This consistency of differentiation may perhaps indicate that the qualities of Test X tended to discriminate creativity more keenly than the qualities of Test Y. In order to reduce conditioning on the cross testing of groups and individuals, the tests were initially constructed so that Test X contained six cursive shapes and Test Y contained six angular shapes. The question then arises: were the cursive components of Test X more conducive to greater discrimination than the angular components of Test Y?

An additional observation also tended to give support to this supposition. Table 8 on page 69 showed that the range of the twelve mean scores on Test X was greater than the range of the twelve mean scores on Test Y, 19.00 to 58.57 for Test X and 42.09 to 64.66 for Test Y. Considering these observations that may have indicated test differences, further research is needed to refine and stabilize the comparability of the two test forms when the procedure necessitates cross testing.

The statistical results, therefore, of the ten comparisons for the five grade groupings did not provide any consistency of significant differences for substantial interpretation. However, the mean scores for these comparisons were then observed to establish some directional trend. This observation revealed that in nine of the ten comparisons the mean scores of the groups were higher than those of the individuals. The only reversal of this direction occurred in the third- and fourth-grade grouping on Test X.

When the findings on this comparison of all grades combined, as depicted in Table 9, are considered, the statistically significant F ratios favoring group creativity could be the result of the observed cumulative effect of a consistent trend. For this reason, it can be inferred that, in general, groups tended to produce a higher degree of nonverbal artistic creativity than did individuals.

Differences between Male and Female Creativity

A major portion of the findings reported in the review of the literature indicated that, in general, there were no differences between male and female creativity. However, on those studies which reported differences, females seemed to have a slight edge on males. The results of this study for the most part supported these latter findings.

Two procedures similar to the previous comparisons were used to compare male and female creativity: one procedure assessed the total grades, the other a division by grade groupings. On the comparison of grades one through twelve combined, females showed a statistically significant level of creativity over males (Table 12, page 76). When groups of grades were examined, the five through seven grade grouping on Test Y and the eight and nine grade grouping on Tests X and Y attained a statistically significant level of creativity for females over males (Table 12, page 76).

The mean scores were then interpreted in graph form to illustrate these findings (Figure 3, page 78). Of the ten observed comparisons, nine depicted a higher level of creativity for females than for males. Here again, similar to the previous comparison, the significant F ratio for all grades combined could be attributed to a consistent cumulative effect of the higher creativity mean scores of females.

The question then arises: why were females more creative than males in the non-verbal artistic domain? Perhaps the answer may be found in the way the sex-roles are developed within the American culture. The cultural bias may appear rather early in society's approach to child rearing. Parents are more culturally accustomed to give greater attention to the artistic-aesthetic appearance of female clothes and in the emphasis placed on their selection. Designated activities and play may also manifest this differentiation. Females are encouraged to participate in the creative artistic development of their environment, whereas males are given responsibilities which are more manual and technical in nature. As a result, the male child may tend to view creative artistic involvements as pertaining to the feminine domain and a threat to society's expectation of his masculinity.

Another aspect of this effect may be ascribed to the school environment. The elementary grades today may be described as female oriented. Aside from the predominant number of female classroom teachers, the overwhelming percentage of art teachers in these grades are also females. The relatively few male art teachers who enter the field often prefer to teach in a more male-oriented high school. Consequently, the young male child early in his educational development begins to associate artistic creative involvements as pertaining to the feminine world. Even before he has the opportunity to enter high school where he may by chance encounter a male art teacher, his perceived cultural bias has already been firmly set.

Torrance demonstrated this cultural bias when elementary school children were asked to select their preferences of creative activities. Male subjects in general avoided selecting creative activities that were related to the arts, whereas females selected these activities with greater preference.

Also evident in this present study were the increased differences in non-verbal artistic creativity between the sexes during adolescence. Female performances were far superior to that of males. It may be that the male senses the implication of the cultural bias early in life, but the force of that bias may become more intense during his adolescence. It is at this stage of his development that the identification of masculinity becomes the central focus of his behavior and interest. Consequently, he may reject activities or behavioral performances that may have relationships to feminine identities.

Eisner also found males to have less interest and knowledge of creative art activities than females during this stage of growth (page 36).

Differences between Creativity of Art and Non-Art Students

The non-verbal artistic creativity scores of students who had taken art and those who had not taken art were compared in order to assess if students who had undergone training in art would attain higher scores on the creativity task used in this investigation than those students who had not received similar training. Only those students from grades nine through twelve were selected because art courses at these levels are electives, thus providing a condition for comparison.

Two statistical comparisons were made between the art and non-art students. The first analysis compared non-art students with one-year art students. In the second analysis, because of the small number of two-year art students, the two-year students were combined with the one-year art students and compared to non-art students. The results showed that no significant differences were attained in any of the comparisons (Tables 13 and 14, page 79).

The studies reported in the literature, with the exception of one, indicated that students who had undergone art training showed significant gains in creativity when compared with students who had not been so exposed. Since these studies used a pre-test--post-test procedure to determine gain and the present study used an assessment at one point in time to examine the differences between the two groups, no direct relationships of a supportive nature could be drawn from the results. However, a conjecture may be made about the no differences between the art and non-art students in light of the findings which have evolved from the literature.

Considering the evidence given by these studies that art training significantly increases general creative ability, it may be speculated that generally those students who had taken art training may have been initially less creative than their counterparts who had not undergone a similar training. As a result of the training, the art students may have raised their level of creativity to a degree slightly better than but not significantly greater than the students who had not received the training. However, since the present study did not utilize the pre-test--post-test method, it therefore becomes difficult to determine to what extent art training affected the creative development of these students.

The following questions are generated by the above assumption. What type of students are more inclined to take art training in secondary schools? Is art training, as a means of enhancing creativity, utilized to the best advantage of secondary school students? An attempt to answer these questions may be a consideration for more research.

Differences between Creativity and Mental Abilities

Each of the five grade groupings were divided into high and low groups on the three dimensions of mental abilities: Verbal Ability, Non-Verbal Ability, and General Mental Ability. The high and low groups were then statistically compared on the dependent variable of non-verbal artistic creativity by use of the t test.

Two testing instruments were administered to attain data on mental abilities. The Lorge-Thorndike Intelligence Test was given to grades one through seven and the Differential Aptitude Tests to grades eight through twelve. The Lorge-Thorndike, however, provided only a non-verbal assessment for grades one and two.

On all of the comparisons of the three dimensions of mental abilities, with the exception of the third- and fourth-grade groupings on non-verbal mental ability, no statistically significant differences were found between the high and low groups on non-verbal artistic creative performance (Table 15, page 81; Table 16, page 82; and Table 17, page 84). The differentiation of behavior of the third- and fourth-grade groupings is another manifestation of their uniqueness which was demonstrated when other variables such as group and individual, sex, art and non-art were compared. This departure from the normative can only be explained as an odd change occurrence of the composition of the groups, thus, not conducive to any generalization.

The differences between the observed scores of the high and low groups on all comparisons did not reveal any consistent trend in creative performance. Consequently, this observation seems to reinforce the "no differences" aspect of the groups for the total population of the study.

An additional investigation was made by assessing the relationships of creativity to the various components of the mental ability instruments. Creativity scores were related to Verbal Ability, Non-Verbal Ability, and General Mental Ability of the Lorge-Thorndike for grades one through seven wherever appropriate and Verbal Reasoning, Language Usage, Verbal Ability, Numerical Ability, Abstract Reasoning, Non-Verbal Ability, and General Mental Ability of the Differential Aptitude Tests for grades eight through twelve.

The product-moment coefficients of correlation for grades one through seven ranged from .02 to .27 (Table 18, page 84). An evaluation of the correlation coefficients indicated a very low relationship between non-verbal artistic creative ability and the various components of the mental abilities. Since these correlation coefficients were so low, an attempt to establish a rationale for the existing differences of the correlation coefficients among the various mental abilities would not be very meaningful. The evidence demonstrated that non-verbal artistic creativity is a different type of cognitive excellence than any of the abilities assessed by the Lorge-Thorndike and the Differential Aptitude.

Furthermore, the findings of the present investigation coincided with the findings of creativity studies reported in the literature which were concerned with a comparison of mental ability and the non-verbal artistic factor. The differences in the findings reported by Guilford and those of the present investigation may be due to the differences in statistical procedures and in the creativity tasks tested. The present investigation assessed non-verbal artistic creativity, whereas those reported by Guilford dealt mainly with verbal creativity.

The underlying reason why mental ability tasks and non-verbal artistic creativity tasks did not relate may be ascribed to the differences in the mental operations, skills, and experiences needed to perform in these prescribed tasks. The Guilford model perhaps provides the best rationale for these differences (pages 18 and 19). The operations needed to perform in mental ability tasks administered in the present investigation are to a high degree associated with memory, cognition, and convergent thinking, whereas those related to non-verbal artistic creativity are to a greater extent divergent thinking and evaluation. There is, however, growing evidence and acceptance that these abilities are not always equally developed in all individuals. Whether or not they are outcomes of inherited or environmental factors are dimensions which are still under question and need much more intensified research. Nevertheless, several studies have shown that some of the abilities related to the mental operations can be increased under situations of special training.

Differences between Creativity and Occupational Groupings

The purpose of the last comparison was to assess if occupation of head of household as an index for socio-economic status had any bearing on the performance of non-verbal artistic creativity. Five classifications--professional, managerial, clerical, skilled, and unskilled--were used to group subjects participating in this investigation. The data were then treated by analysis of variance to discover if statistical differences existed among the groupings on creative production.

The two analyses for Tests X and Y indicated that there were no statistically significant differences among the five occupational groupings on creative performance for all subjects combined (Tables 19 and 20, page 86). When creativity mean scores were ranked from professional to unskilled, no evidence was seen of any consistent trend between the two tests (Table 21, page 87, and Figure 4, page 88). An additional observation was made by combining the scores of the two tests into a generalized graph. Here the managerial grouping showed a slightly better performance on creativity than any of the other four occupational classifications. This indication, however, is not significant enough to warrant a rational conclusion.

Thus, the findings of this comparison did not differ from the results reported by a majority of studies in the literature. Therefore, from the evidence it can be concluded that various socio-economic environments did not have any adverse affects on the non-verbal creative performances of students. Although there is justification for such a conclusion, there is also, however, a great need for further depth investigations in this area. In order to make more meaningful comparisons, these investigations should concentrate on more detailed and pertinent information that would develop fuller and more realistic pictures of family life styles as indices for the cultural and socio-economic background of students. More specifically, the question that can be explored is: what aspects of the cultural involvements of family life within each of the various socio-economic levels are conducive to greater creative expression.

Summary of Conclusions

The previous section summarized, interpreted, and broadly discussed the results of the study. The following statements are brief summaries of the conclusions:

1. A high level of agreement was reached among the judges on the three criteria: Redefinition, Originality of Elaboration, and Fluency of Ideas. Aesthetic Organization attained a moderate level of agreement.
2. The composite score was the most stable measure of non-verbal artistic creativity when compared with the individual criterion scores.
3. Older students were more creative than younger students. The greatest manifestation of creativity was evident at about the tenth grade and beyond, reaching its peak at about the eleventh grade.
4. Groups, in general, tended to produce a higher degree of non-verbal artistic creativity than individuals.
5. Females, generally, tended to be more creative than males.

6. There were no significant differences between art student and non-art student in creative production.
7. High mental ability groups were not significantly more creative than low mental ability groups.
8. The results demonstrated that non-verbal artistic creativity was a different type of cognitive excellence than any of the abilities assessed by the Lorge-Thorndike and the Differential Aptitude.
9. The evidence revealed that various socio-economic environments do not adversely affect the non-verbal artistic creative performance of students.
10. Test X showed a greater variance of non-verbal artistic creativity than Test Y.

Implications and Recommendations

Important to this study, as to any other study, are, on the one hand, the implications for education that can be derived from the results and, on the other hand, the recommendations for further research that can be set forth as an extension of the findings. This section will deal with an exploration of these two essential dimensions.

There is a concern, as a result of the present investigation and other investigations of similar nature, to establish a common operational taxonomy of criteria to evaluate non-verbal artistic creativity. Perhaps the focus of this concern should be concentrated on the development of a clearer understanding of the relationship between the points of departure and the degrees of departure in evaluating each dimensional criterion. If such specificity and clarity of criteria could be established, then the evaluation procedure of judging and scoring would be facilitated.

Since the results of Tests X and Y did not show a high degree of consistency in the fluctuation of creative behavior for each of the twelve grade levels, the evidence could only be dealt with speculatively. The phenomenon of inconsistency could be attributed to either the differences in the constitution of the groups or the differences in the constitution of the creativity tests. There is consequently greater need for further validation of instruments and the utilization of larger samplings for repetitive testing at each grade level.

If further research on this aspect of creative behavior is to have greater meaning and impact on education, research designs should give adherence to the variables present in school curricula, methodologies, and teaching styles. Attention also should be given to exploring the affects of physical, social, and psychological growth factors on non-verbal artistic creative behavior.

Although the findings of group vs. individual creativity for all subjects combined favored group creativity, the results, however, of the five grade groupings were somewhat inconsistent in view of the two creativity tests. In other words, the phenomenon that individuals who are in the first two grades of elementary school and those who are in the last five grades of secondary school can manifest superior creative production in groups than as individuals was only partially substantiated by the findings. If such indications can be further statistically supported by more extensive and intensive repetitive research at each grade level, then teachers would have some reliable empirical knowledge upon which to plan activities for either individuals or groups in order to maximize non-verbal artistic creativity.

Not only should such research studies be concerned with a comparison of group and individual creativity, but also with comparisons of creativity among groups of different constitutions. These explorations could be conducted by comparing such combinations as: randomly selected groups, self-selected groups, homogeneous groups, and heterogeneous groups. Furthermore, to better understand creative group behavior, investigations should be undertaken that would examine various group sizes and the interaction that would occur among individuals within these groups.

When individual creativity was compared to the independent variables such as differences in sex, art education, mental abilities, and occupational groupings, the results of several of these comparisons indicated significant implications to education and, in some areas, the need for further research.

The findings in this study that females, in general, are more creative than males on non-verbal artistic creative performance have some bearing on the climate present within educational environments. The cultural bias of society that fosters this differentiation also seems to be reinforced by the culture within the schools. What may be necessary to help alleviate the bias is the collective efforts of teachers and administrators to counteract through the process of education the cultural bias of society on sex role differentiations that deters creative behavior in males.

Since the present investigation only assessed the differences between art and non-art students on non-verbal artistic creativity and inferred the effects of art education on that performance, further research is needed to better understand how the various aspects of art education may raise the level of creative performance of individuals.

The variables which have been most extensively explored are those related to mental abilities and creativity. Most of these studies have been concerned generally with verbal creativity, and only a relatively few have related the dimensions of non-verbal artistic creativity. It is in the area of non-verbal creativity that more research should be focused. The concentration should be placed on an exploration of the identified mental operations that are associated with non-verbal artistic creative abilities and mental abilities.

The area least touched upon by creativity research is the assessment of the effect of socio-economic backgrounds on creative performance. The results of the present investigation indicated that non-verbal artistic creativity of individuals is not adversely affected by socio-economic environments. Since the occupational classification was the only index used for socio-economic backgrounds, much deeper investigations should be designed to give broader meaning to the findings of the present study. The various components of creative behavior should be analyzed in terms of a more extensive definition of socio-economic life styles. These investigations would shed light on the degrees to which the various aspects of an individual's creative behavior are affected by the variables within his socio-economic background. Such knowledge is essential to the field of education in designing appropriate curricula which would establish a climate for the growth of creativity.

In conclusion, the present investigation has been an initial probing into the dimensions of non-verbal artistic behavior of individuals and groups. Even though the results of the comparison of individuals vs. groups could only be speculatively interpreted, they did, however, provide directions that may be of great value to future research. A major portion of the findings on the independent variables of sex, art education, mental abilities, and socio-economic backgrounds supported the results reported by many of the studies in the literature. The outcome of the findings made evident several imperative needs for some reorientation of the educational environments as a means of fostering the aspect of creativity in individuals and groups. In addition, recommendations were made concerning the directions research should take in order to develop better understandings and meanings in the various areas of creativity.

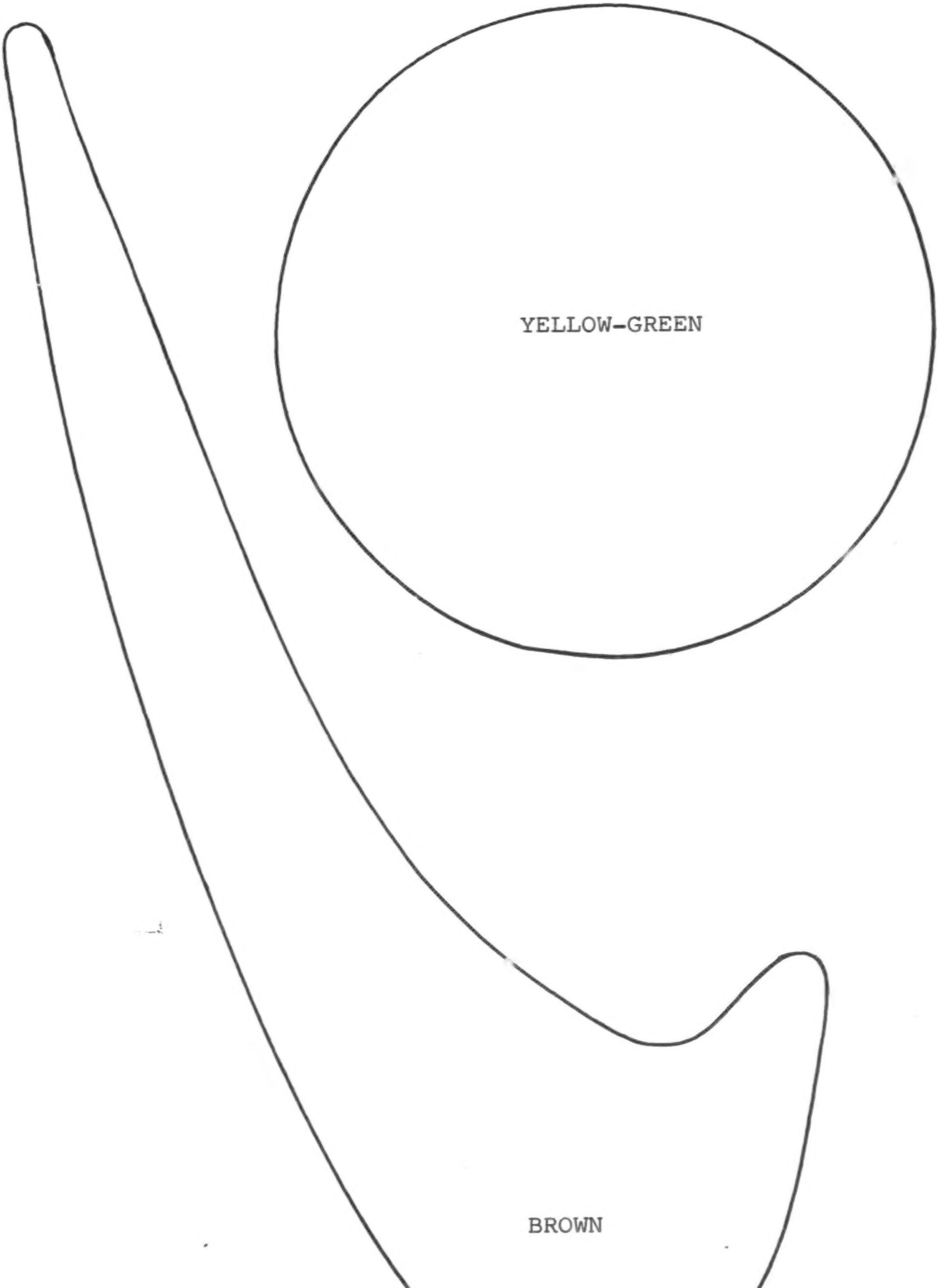
APPENDICES

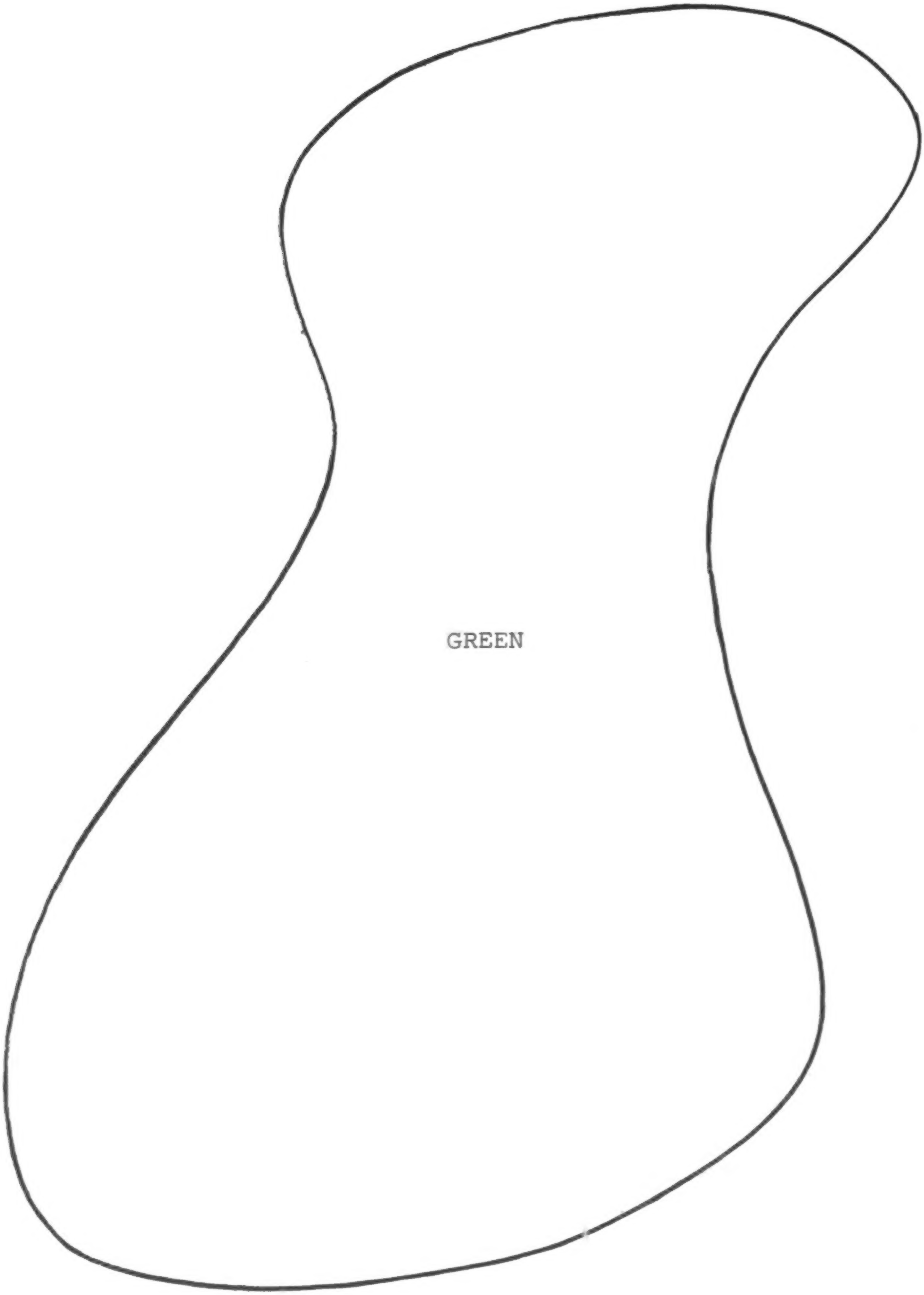
APPENDIX A

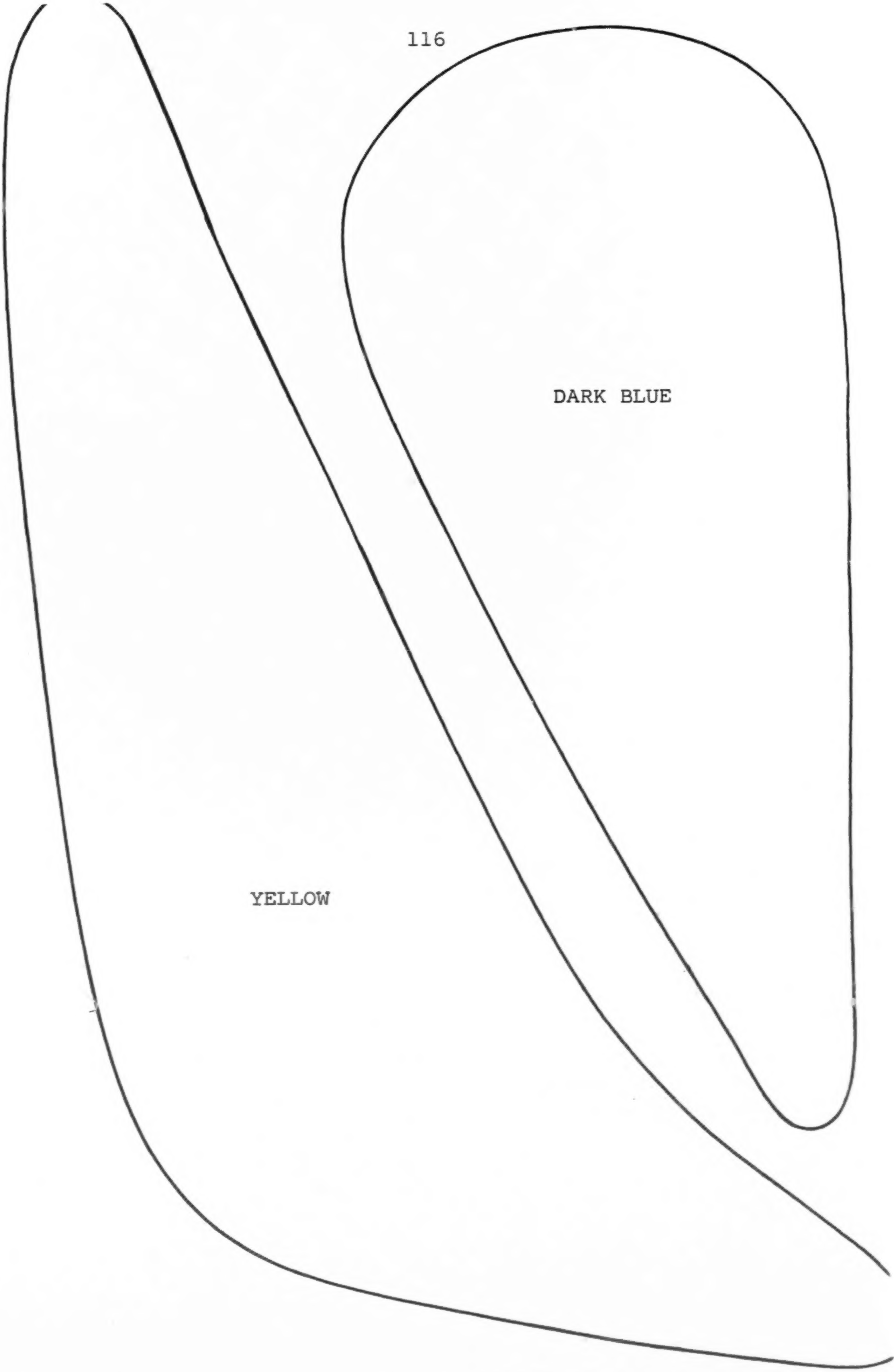
NON-VERBAL ARTISTIC CREATIVITY INSTRUMENT FACSIMILES OF TESTS X AND Y

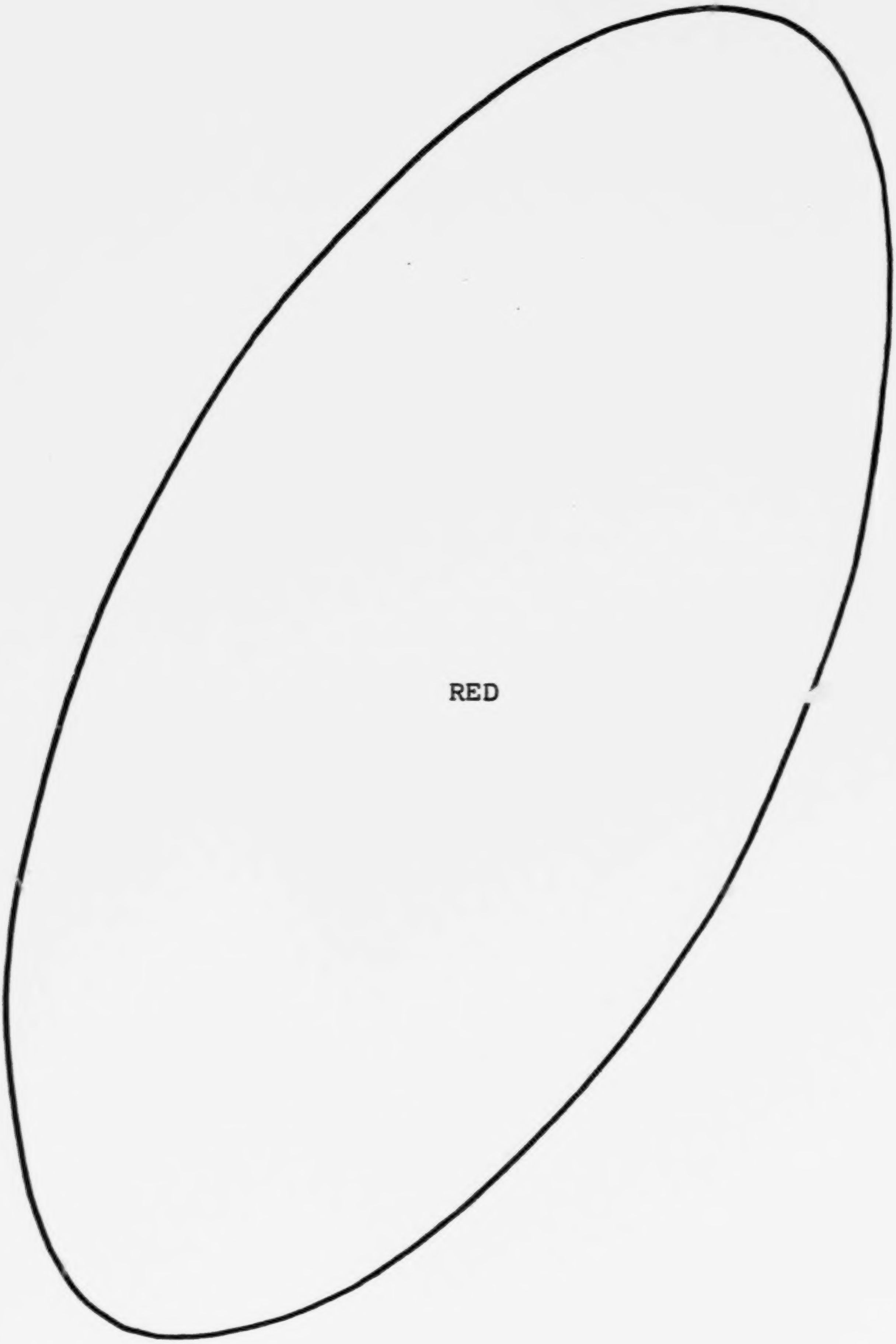
TEST X

Test X consists of six colored cursive shapes and a neutral gray 12" x 18" rectangular background sheet. On the following four pages, the six cursive shapes are outlined in actual size with their respective color indicated.


YELLOW-GREEN
BROWN


GREEN

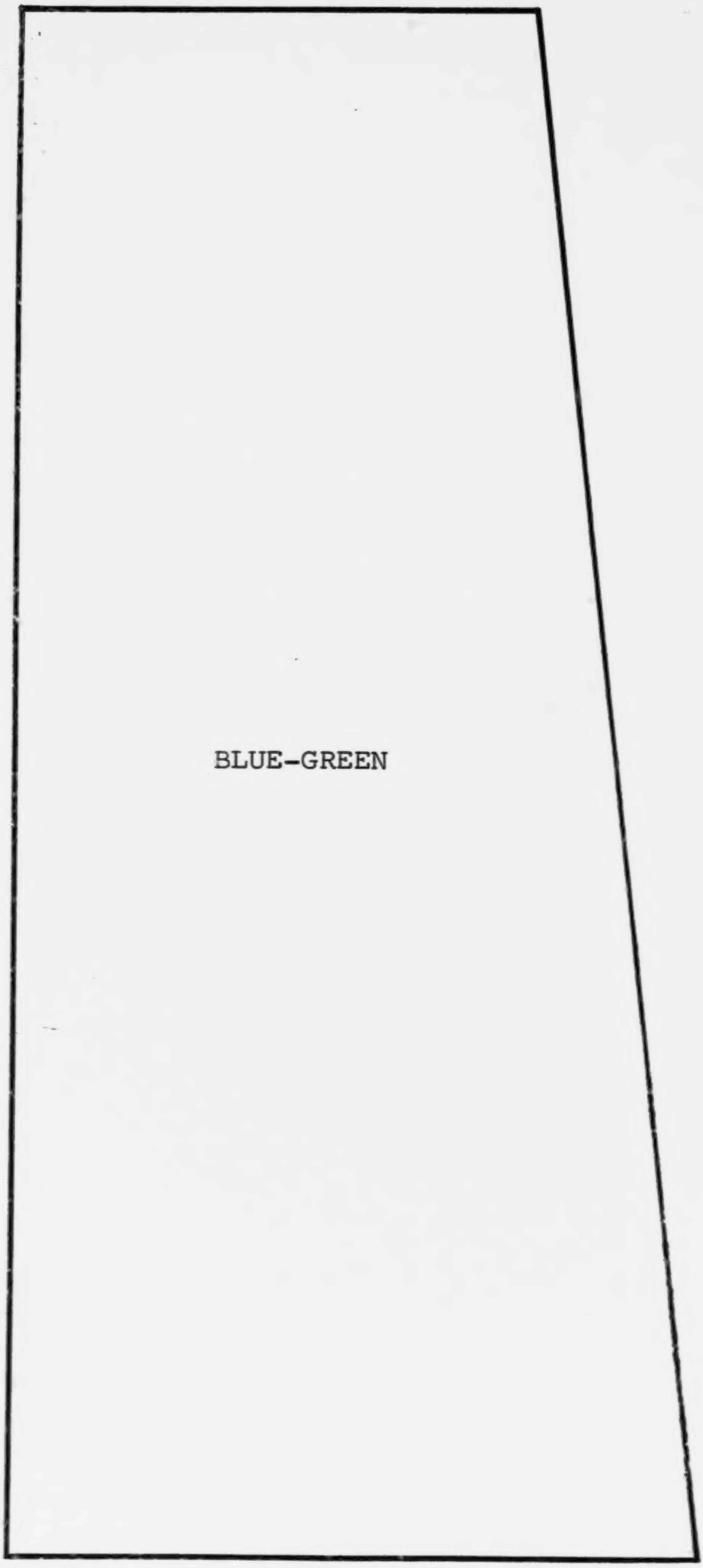

DARK BLUE
YELLOW



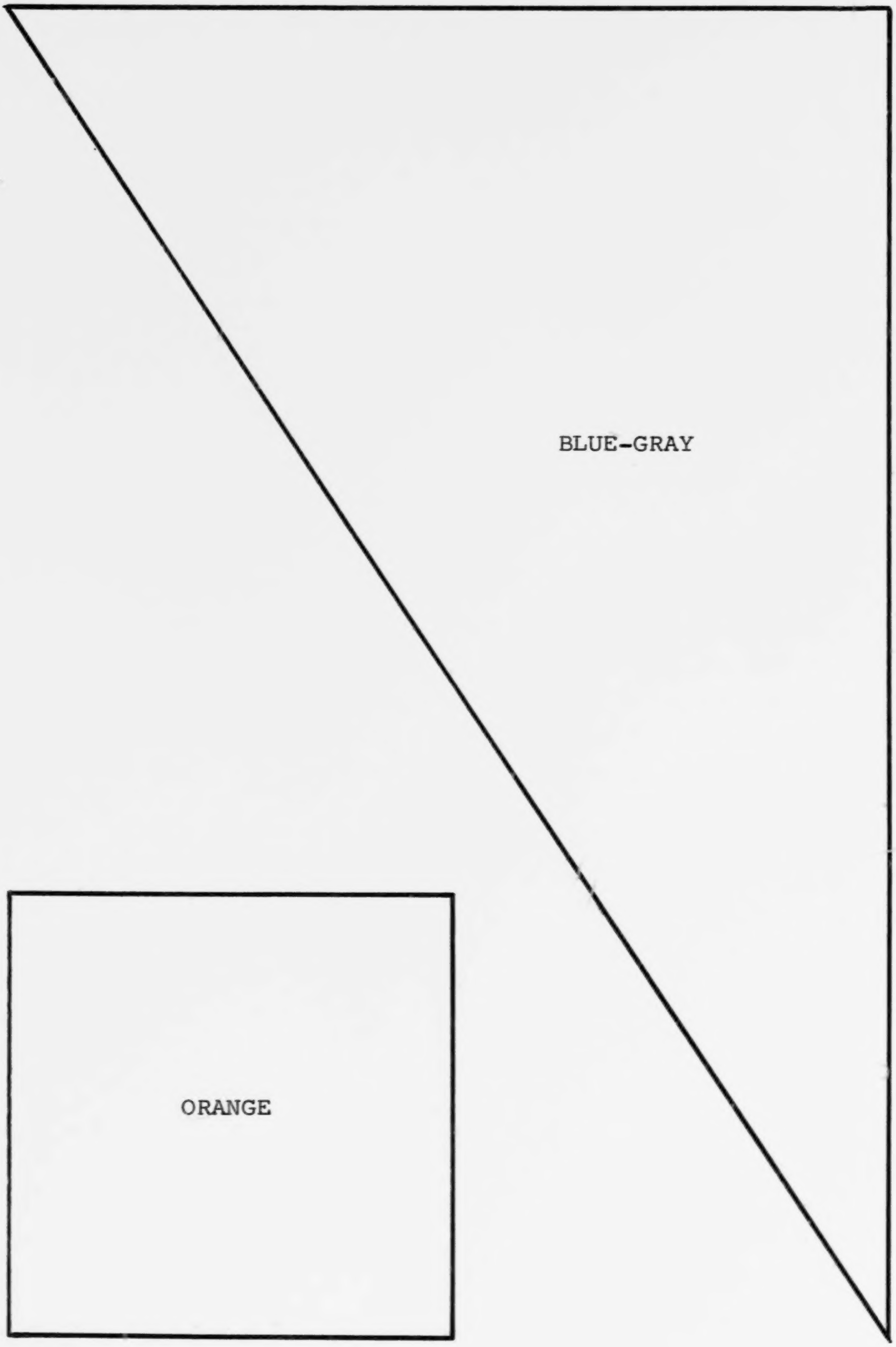
#3

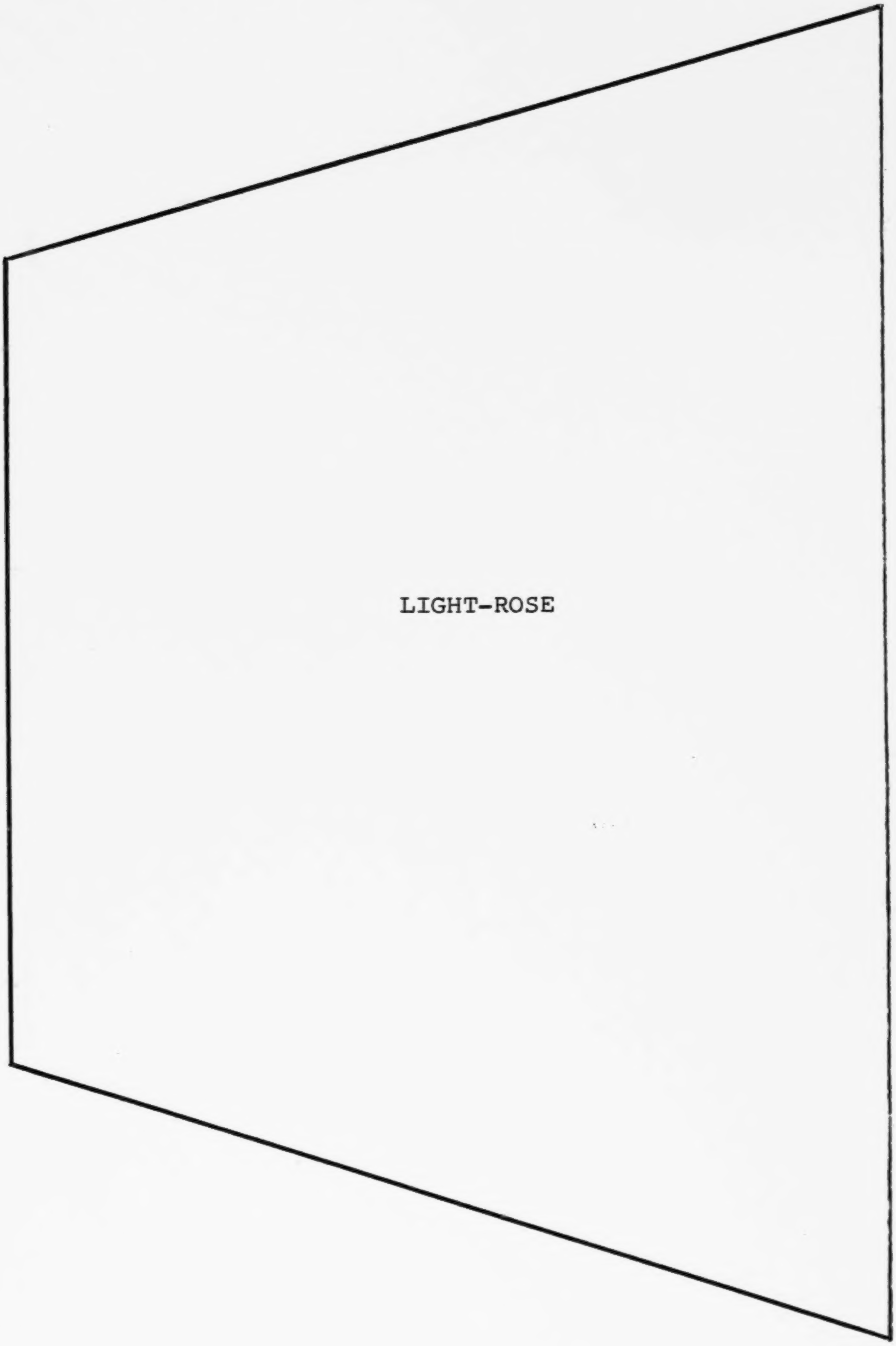
TEST Y

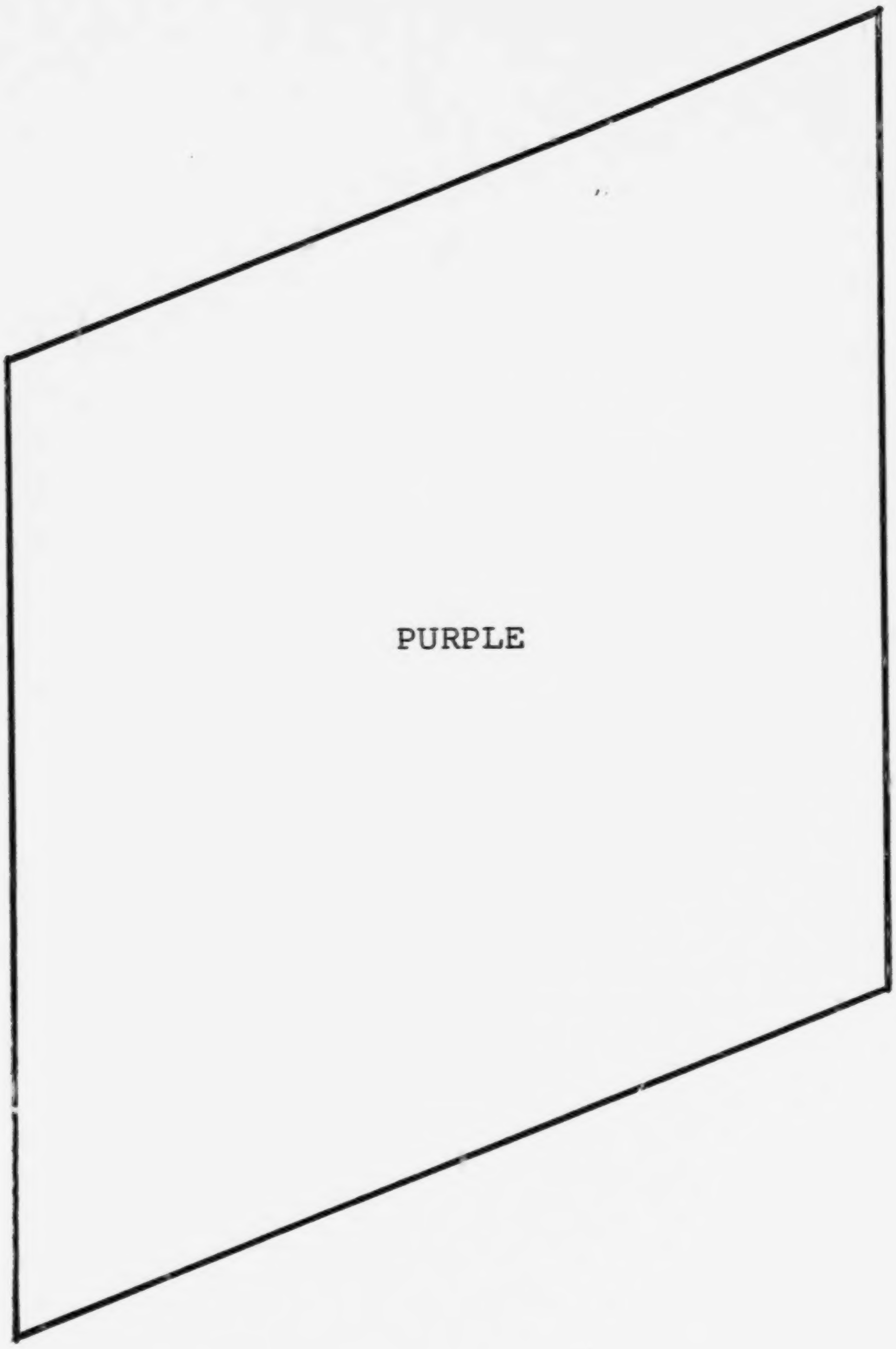
Test Y consists of six colored angular shapes and a neutral tan 12" x 18" rectangular background sheet. On the following four pages the six angular shapes are outlined in actual size with their respective color indicated.


BLUE-GREEN

LIGHT
GREEN


BLUE-GRAY
ORANGE


LIGHT-ROSE


PURPLE

APPENDIX B

THE TESTING MODEL
AND
INSTRUCTIONS FOR ADMINISTERING TESTS X AND Y TO GROUPS AND INDIVIDUALS AT EACH GRADE LEVEL

TESTING MODEL FOR EACH GRADE LEVEL

The following diagram represents the testing model used to administer the Non-Verbal Artistic Creativity Tests to each grade level.

TESTING MODEL FOR EACH GRADE LEVEL

Group A		Group B	
Group Basis	Test X	Individual Basis	Test X
Individual Basis	Test Y	Group Basis	Test Y

The students in each grade level were divided randomly into two groups. The groups were labeled A and B. Tests X and Y were administered in the following manner: (1) Test X was administered to Group A on a group basis, each subgroup producing a single product; (2) Test X was also administered to Group B at the same time, in a separate room on an individual basis, each individual producing a single product; (3) the procedure was then reversed for Test Y for each grade level. Twenty-four hours or more after taking Test X, Test Y was administered to Group A on an individual basis and to Group B on a group basis.

INSTRUCTIONS FOR ADMINISTERING THE NON-VERBAL ARTISTIC CREATIVITY INSTRUMENT TO GROUPS

I. On the table in front of you, you will notice a sheet of paper and an envelope. Inside the envelope there are six different shapes of colored paper. In addition, there are several pairs of scissors and several packages of paste.

II. Please listen to the following instructions carefully:

1. Open the envelope and take out the six shapes, scissors, and packages of paste. (The administrator should check each item with the students.)

2. What you are going to do is to use the six shapes in front of you in any way you wish to use them. However, keep in mind that whatever you do should be something that no other group in this class would think of doing--except your group.

3. The students in each group should work together and should decide as a group whatever it is you want to do. Whatever it is that you decide to do should be pasted on the large sheet of paper in front of you.

4. Take as much time as you feel you need, and as soon as you feel that you are finished with whatever you are doing, bring it up to me and return to your classroom.

5. We suggest that when you are working that you work by yourself as a group and do not interfere with the work of any other group.

6. Are there any questions about the instructions?

(Note to the administrator of the test: If the student's question is not related to the instructions, tell him that you cannot answer his question and that he is to make the decision with the other students in the group.)

7. Begin your work.

INSTRUCTIONS FOR ADMINISTERING THE NON-VERBAL ARTISTIC CREATIVITY INSTRUMENTS TO INDIVIDUALS

I. On the table in front of you, you will notice a sheet of paper and an envelope. Inside the envelope there are six different shapes of colored paper. In addition, there are a pair of scissors and a package of paste.

II. Please listen to the following instructions carefully:

1. Open the envelope and take out the six shapes, scissors, and package of paste. (The administrator should check each item with the students.)
2. What you are going to do is to use the six shapes in front of you in any way you wish to use them. However, keep in mind that whatever you do should be something that no other individual in this class would think of doing--except you.
3. Whatever you decide to do as an individual should be pasted on the large sheet of paper in front of you.
4. Take as much time as you feel you need, and as soon as you feel that you are finished with whatever you are doing, bring it up to me and return to your classroom.
5. We suggest that when you are working that you work by yourself and do not interfere with the work of any other individual in class.
6. Are there any questions about the instructions?
   (Note to the administrator of the test: If the student's question is not related to the instructions, tell him that you cannot answer his question and that he is to make the decision by himself.)
7. Begin your work.

APPENDIX C

GENERALIZED AND SMOOTHED CREATIVITY COMPOSITE MEAN SCORES OF INDIVIDUALS FOR GRADES ONE THROUGH TWELVE AND GENERALIZED CREATIVITY COMPOSITE MEAN SCORES OF INDIVIDUALS BY OCCUPATIONAL GROUPINGS FOR ALL GRADES COMBINED

GENERALIZED AND SMOOTHED CREATIVITY COMPOSITE MEAN SCORES OF INDIVIDUALS FOR GRADES ONE THROUGH TWELVE

In order to generalize the growth of non-verbal artistic creativity from grades one through twelve, the creativity composite scores for individuals on Tests X and Y were combined at each grade level to produce a generalized composite score. The generalized composite scores were then arithmetically computed to produce the smoothed composite scores. The means of these scores are presented in Table 22 and Figure 5.

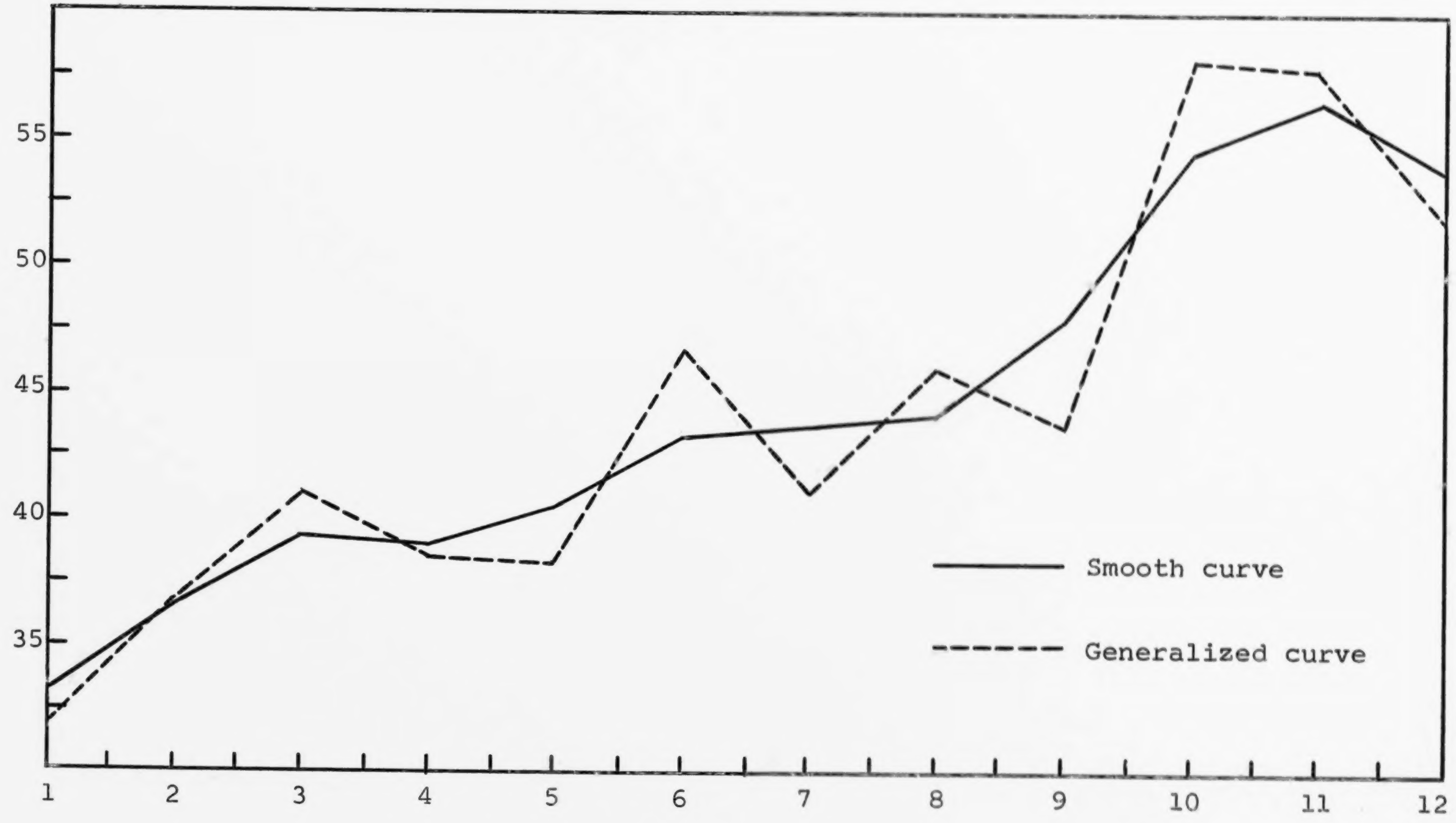
TABLE 22

GENERALIZED AND SMOOTHED CREATIVITY COMPOSITE MEAN SCORES OF INDIVIDUALS FOR GRADES ONE THROUGH TWELVE

Grade	n	Generalized Mean	Smoothed Mean
1	20	31.70	33.36
2	21	36.67	36.53
3	27	41.07	39.33
4	28	38.54	39.14
5	23	38.39	40.55
6	27	46.88	43.33
7	58	41.16	43.83
8	62	46.10	44.30
9	64	43.82	48.02
10	54	58.34	54.66
11	52	58.14	56.66
12	63	52.00	54.04

FIGURE 5

GENERALIZED AND SMOOTHED CREATIVITY CURVES
OF COMPOSITE MEAN SCORES OF INDIVIDUAL FOR GRADES ONE THROUGH TWELVE



GENERALIZED CREATIVITY COMPOSITE MEAN SCORES OF INDIVIDUALS BY OCCUPATIONAL GROUPINGS FOR ALL GRADES COMBINED

To facilitate closer observation of the effect of socio-economic environment upon the non-verbal creative performance of students, a generalized score was derived. This score was obtained by summing the composite scores of both Tests X and Y for individuals in all grades within each socio-economic level producing five generalized scores. Table 23 and Figure 6 present the means of these generalized creativity scores.

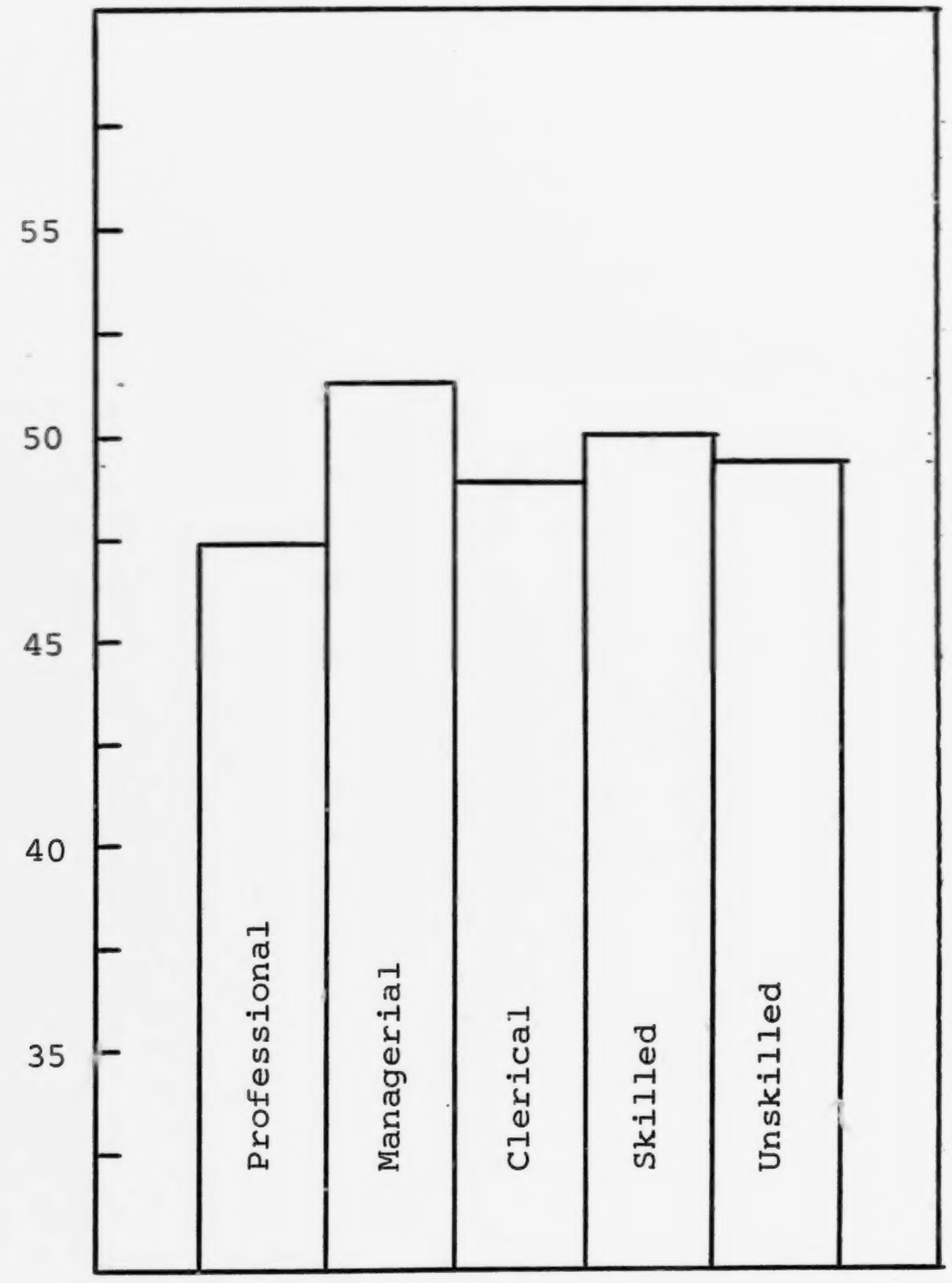
TABLE 23

GENERALIZED CREATIVITY COMPOSITE MEAN SCORES OF INDIVIDUALS BY OCCUPATIONAL GROUPINGS FOR ALL GRADES COMBINED

Occupation	n	Mean
Professional	201	47.60
Managerial	71	51.47
Clerical	117	49.23
Skilled	61	50.15
Unskilled	46	49.51

FIGURE 6

GENERALIZED CREATIVITY BAR GRAPH
OF COMPOSITE MEAN SCORES OF OCCUPATIONAL GROUPINGS
FOR ALL GRADES COMBINED



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